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Contents.

	PAGE
BARCELONA	303
THE TRADE UNION CONGRESS	306
NOTES	307
THE STRENGTH OF RIVETED JOINTS	308
BLACKFRIARS BRIDGE WIDENING	311
THE WORK OF THE ROYAL COMMISSION ON SEWAGE DISPOSAL	311
NOTES FROM FRANCE	313
LEGAL COLUMN	313
MEETINGS	314
FIFTY YEARS AGO	314
ILLUSTRATIONS:—	
LAVENHAM CHURCH TOWER	314
BERKSHIRE COUNTY COUNCIL OFFICES, READING	314
PROPOSED CHURCH AT BATTS CORNER, FRENSHAM	315
ALMSHOUSES AT STRATFORD-ON-AVON	315
APPLICATIONS UNDER THE 1894 BUILDING ACT	316
ARCHITECTURAL SOCIETIES	317
THE "BEST" ENLARGING AND REDUCING SCALE	317
LONDON AND DISTRICT BOROUGH COUNCILS	317
PROJECTED NEW BUILDINGS IN THE PROVINCES	318
COMPETITION NEWS	318
TRADE CATALOGUES	318
BOOKS RECEIVED	318
CORRESPONDENCE:—	
REINFORCED CONCRETE	318
ELTHAM PARISH HALL COMPETITION	319
ST. ALFEGE, GREENWICH	319
INSECTS IN TIMBER ROOFS	319
OBITUARY	319
GENERAL BUILDING NEWS	319
STAINED GLASS AND DECORATION	320
SANITARY AND ENGINEERING NEWS	320
MISCELLANEOUS	321
PATENTS	321
LIST OF COMPETITIONS, CONTRACTS, ETC., OPEN	322
PRICES CURRENT	324
TENDERS	325

SUPPLEMENT:—

REVIEWS OF BOOKS.

E. H. Sedding's "Norman Architecture in Cornwall"; R. J. Haddon's "Australian Architecture: A Technical Manual for all those engaged in Architectural and Building Work"; R. W. Billings's "The Baronial and Ecclesiastical Antiquities of Scotland," Parts XII. to XVI.; G. S. Coleman's "Reinforced Concrete Diagrams"; W. N. Twelvetrees's "Reinforced Concrete Construction"; T. Potter's "Concrete. Its Uses in Building from Foundations to Finish"; A. C. Davis's "Portland Cement"; A. L. Colby's "Reinforced Concrete in Europe"; "The Concrete Institute; Transactions and Notes," Vol. I., Part 3; H. R. Mill's "British Rainfall, 1908"; H. B. Richey's "The Building Mechanics' Ready Reference"; C. Xydis's "Handbook on Tacheometrical Surveys"; W. C. Easdale's "The Practical Management of Sewage-disposal Works."

MAGAZINES AND REVIEWS.

Illustrations.

LAVENHAM CHURCH TOWER. MEASURED AND DRAWN BY MR. ALAN G. BRACE.

FIRST PREMIATED DESIGN FOR BERKSHIRE COUNTY COUNCIL OFFICES, READING. BY MESSRS. WARWICK & HALL.

1. ELEVATIONS AND PLANS.
2. DETAIL ELEVATION.

CHAPEL OF EASE, FRENSHAM, SURREY. MR. W. CURTIS GREEN, A.R.I.B.A., ARCHITECT.

Illustrations in Text.

	PAGE
BARCELONA:—	
BARCELONA CATHEDRAL; VIEW OF THE TRANSEPT TOWERS FROM THE ROOF OF THE CLOISTERS	304
SKETCH PLAN, BARCELONA	305
BRIDGE OVER THE LLOBREGAT, NEAR BARCELONA	306
THE STRENGTH OF RIVETED JOINTS:—	
FIG. 1	308
FIGS. 2 TO 5	310
PLANS OF LAVENHAM TOWER	314
ALMSHOUSES AT STRATFORD-ON-AVON	315

Barcelona.

BARCELONA, the scene of such a remarkable revolution within the past few weeks, is a noteworthy place from an architectural standpoint, or rather from several architectural standpoints, both ancient and modern.

In ancient days the province of Catalonia furnished a school of architects and masons, who, evidently following the course of the semi-crusading, semi-buccaneering enterprise and commerce of the XIth-XIVth centuries, established a perceptible influence on the design and decoration of the great Frank monuments which still survive in the Levant. The great abbey of Bella Pais, and the cathedral of Famagusta in Cyprus, are of a distinctly Catalan character, just as the cathedral of Nicosia, Cyprus, and the Gothic buildings of Jerusalem are of the earlier French importation.

It is to be hoped that the great and beautiful Gothic churches of Barcelona, the XIVth-century cathedral, and Santa Maria del Mar have not been injured to any great extent during the recent rioting. A venerable building, the convent of S. Pablo, was wrecked by the mob, which, not for the first time perhaps in Spanish history, seems to have been actuated by a spirit of anti-religious fanaticism. The district swept by the guns of the fortress on Mount Juich is, however, comparatively modern and uninteresting, and lies outside the confines of the ancient city marked by the Rambla (*Arab*, Ramleh, a sandy place), which is perhaps one of the earliest instances of a fortification turned into a boulevard. S. Pablo during the middle ages would have been a suburban church; and after its enclosure within the fortification of a later period it has, of course, been much "restored" and modernised. Another ancient church—S. Pedro de Puellas—shared the same fate, but this was an even less important example of mediæval art, its tower being the only portion remaining of an artistic character.

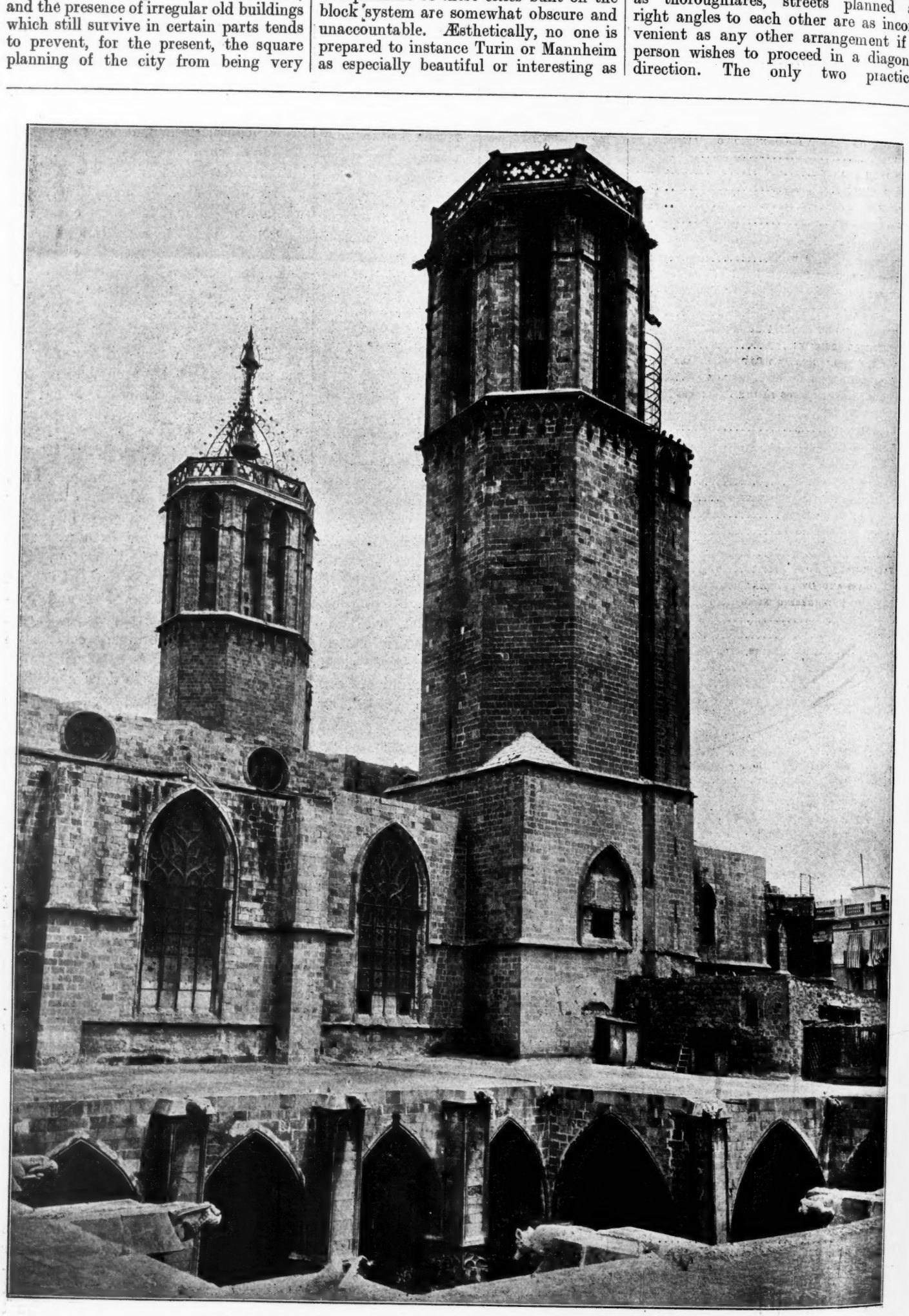
During the XIXth century Barcelona underwent a most remarkable transformation. As the most important city of Spain, competitor with Marseilles, Genoa, and Naples in the world-commerce which centres in the Western Mediterranean, Barcelona has become an enormous commercial centre on a scale which rivals any European city or urban district, with the exception of London. The carrying out of the extension of the urban district is one of the most remarkable things of the kind on record. How it could have been brought about in so complete a manner remains a matter of surprise to the visitor. The idea of this wonderful scheme is attributed to the alcalde Ruis y Taulet, to whom a monument has been erected in a prominent position in the midst of the new quarters of which he was the originator.

Up to the middle of the XIXth century Barcelona remained an old-world city within the usual earthwork fortifications of a now entirely obsolete character, with a large citadel standing at the north-east corner to defend the already important port. At the present day not a trace of these old-world appearances survives. The citadel has been levelled with the surrounding area, and the site converted into a large public park, an ancient palace once within its walls having been preserved to the use of a municipal museum. The old enceinte of the city has, of course, long since been demolished and converted into the usual boulevards (*Span.* "rondas") of the ordinary continental city.

The most remarkable development of city extension has, however, taken place during the last twenty years. During that period the surrounding country and suburbs have been brought within the operation of a building scheme which regulates the planning of new streets and quarters according to the rectangular block system adopted in some modern American cities. The area taken within the new limits of Barcelona is considerable; the principal street, if ever completed, will be 10 kilometres long, and of an average width of 40 metres, or more than 130 ft. The shorter sides of the new city will have a length of more than 5 kilometres. Within this area the land is divided up into more than 1,000 square blocks, all of precisely the same dimensions, 100 metres by 100 metres, with their four corners cut off for the convenience of the thoroughfare. Each of these block sites is apparently supposed to meet all the requirements of house-owners, who are, of course, not expected or permitted to make use of more land for any one house or manufactory than the area of 10,000 sq. metres. Certain exceptions were, of course, inevitable: the railway-stations break through the exact regularity of the scheme on account of the necessarily large area they occupy,

and certain important buildings, such as a hospital, a prison, etc., have to be accommodated with two or three blocks. This vast area of about 50 sq. kilometres is only partially occupied by the new buildings, all set square with each other, and the presence of irregular old buildings which still survive in certain parts tends to prevent, for the present, the square planning of the city from being very noticeable. In course of time, as the new streets are lined up with houses, the rigid regularity of the suburbs will give a marked character to Barcelona.

The objects in view with the schemers and planners of these cities built on the block system are somewhat obscure and unaccountable. Æsthetically, no one is prepared to instance Turin or Mannheim as especially beautiful or interesting as old examples of the idea, and certainly the great American examples of such civic planning have never excited much public praise. For "viability" (to coin a word from the Italian) or convenience as thoroughfares, streets planned at right angles to each other are as inconvenient as any other arrangement if a person wishes to proceed in a diagonal direction. The only two practical



Barcelona Cathedral; view of the transept towers from the roof of the cloisters.

objects which the arrangement facilitates are perhaps drainage and street lighting. In the matter of police supervision there may also be some slight advantage, although Barcelona as an example of such towns seems to be but little better off, to judge by recent events.

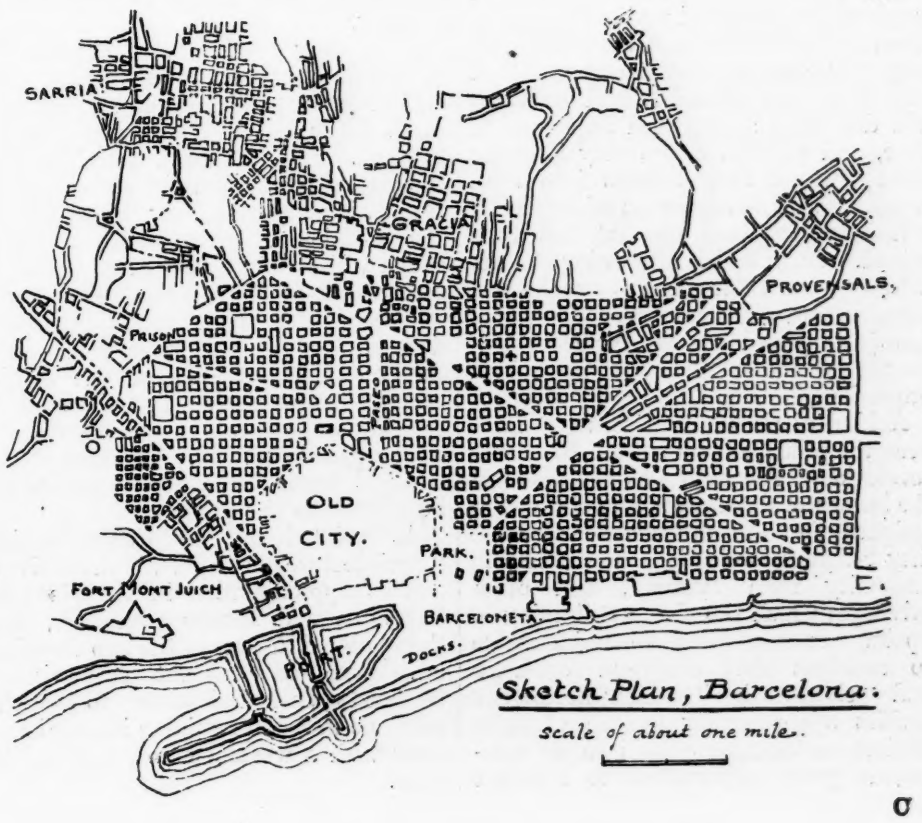
The planning of a town on the square block system has one or two serious drawbacks at the present day which would not have been within the experience of such enthusiasts in the matter as Ruis y Taulet. All modern towns are intersected by tramway-lines on which the majority of the citizens are continually travelling, and only those persons who have lived in such square-built towns can tell of the tiresome and even injurious effect on the eyes of continually passing endless successions of streets, with the long perspectives presented in rapid and regular rotation to the sight. Another inconvenience connected with the trams and railways is the necessity of laying them with many right angles. In the case of Barcelona several of the tramways and railways preceded the laying-out of the new districts, and in some cases their lines cut across the chessboard plan.

Æsthetic arguments against such a mode of laying out a city must, however, always be of the greatest importance. Turin, with its 300 or 400 years of age and its massive brick buildings of a pompous and magnificent style, and, above all, from its being built all in one taste, has a certain grandeur of effect. It must also be remembered that many parts of Turin are laid out with a view to impressive and special scenic effect. In Barcelona, on the other hand, and in most modern cities of the type, a mere utilitarian object is kept in view, and as a consequence the effect is poor and sordid to an extreme degree. As everywhere else, the better-class quarters of the new town are characterised by buildings in all sorts of styles, and with various attempts to impart originality and variety within each 1,000 metres. The poorer classes are, of course, content with less pretentious exteriors to their homes, and their quarters are of the usual uninteresting type, and of the same squalid monotonous character which, alas! seems to be inseparable from the dwellings of the poor in all our great modern centres of population. In the poorer districts of all Spanish and Italian cities which have sprung up within recent years, a perceptible deterioration in some of the outer appearances of the houses is perhaps due to attempts at greater pretension and less fulfilment than in the old-fashioned slums of the last century. Unlike London or other northern capitals, the working-class districts have a ruinous, half-finished look which compensates in some degree of picturesqueness, perhaps, for the extreme ugliness of design usually adopted.

In reference to the quadrilateral, chessboard planning of the modern city, it may be supposed, without improbability, that Ruis y Taulet and his supporters were influenced by considerations of a strategical kind in anticipation of some such disorders as have recently taken place. For long past Barcelona has been known as one of the most turbulent cities of Europe, and the hotbed of socialistic revolutionary movements. This unenviable reputation may have aroused the civic authorities to a sense of the importance in city planning of arrangements for controlling unruly mobs. Experience seems, however, to have shown that it was as easy for the rioters to erect barricades in this most modern of cities as in the tortuous streets of old Paris; and it is a little curious to find that some of the most serious street fighting took place amongst the rectangular streets of Clot and San Martino de Provensals. This very serious and sanguinary revolutionary riot from which Spain has lately been suffering was possibly subdued, but not without difficulty, in a shorter time, owing to the still somewhat unusual planning of the scene of operations. The straight and rectangular plan would naturally afford an easier passage for troops, and especially for the use of artillery, than the more ancient type of city. Baron Haussmann is generally credited with the idea of rendering Paris less liable to the consequences of revolutions and social disturbances by driving long boulevards through the slum quarters, and paving them with asphalt. It was supposed that an asphalt road would scarcely lend itself to barricade erection, but in our modern times it would seem that a revolutionary mob finds materials for barricades in overturned electric tramcars and motor-buses, and even finds these modern materials easier to handle than the old piling-up of paving-stones.

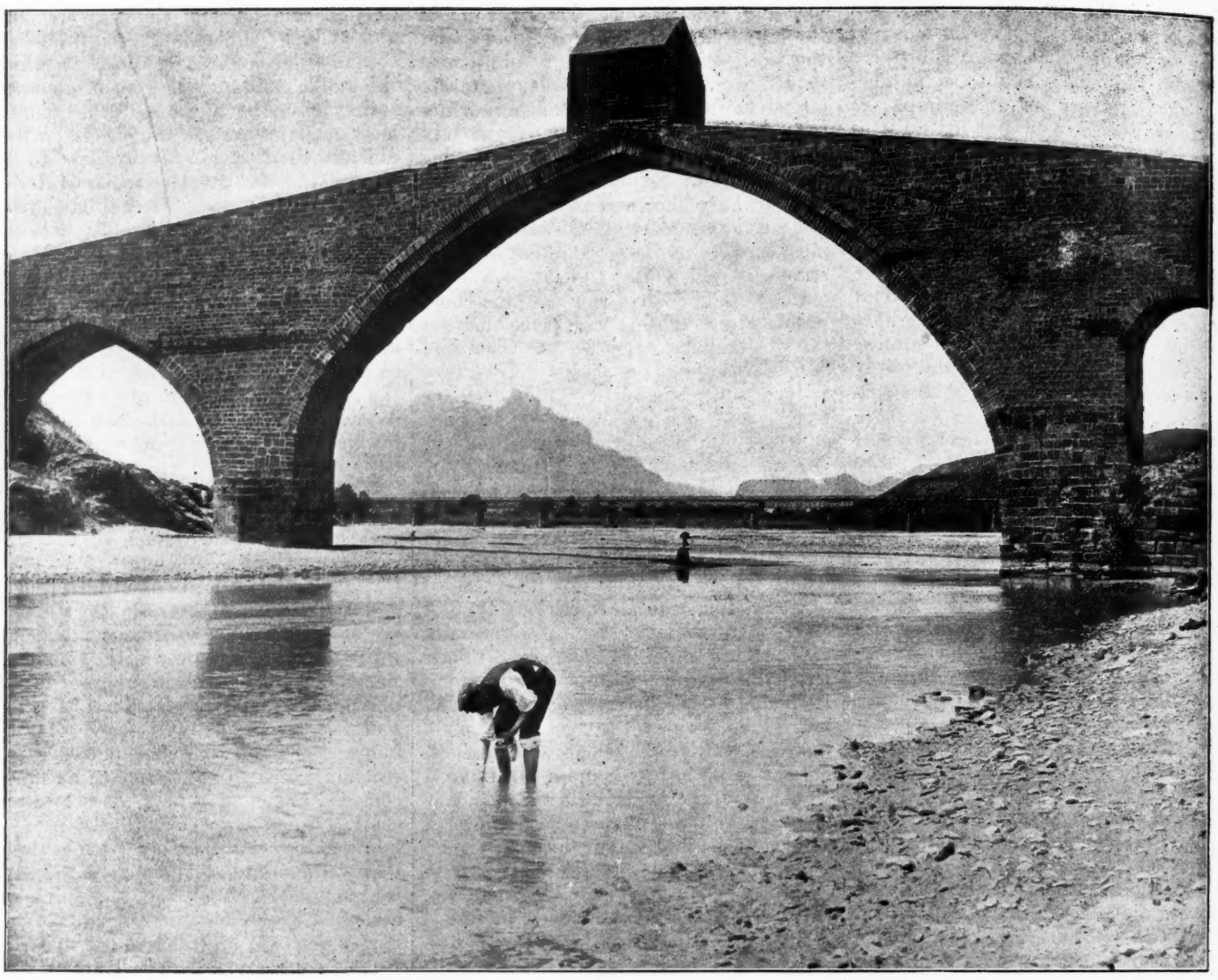
Perhaps the most remarkable architectural feature in modern Barcelona is a church which is being built in the north-west quarter of the new city, occupying the greater part of one of the 1,000-metre enclosures. It is dedicated to the Sagrada Familia (*Iglesia erpiatoria*), and is being erected from the designs of an architect named Gaudi. The only portion completed of this very remarkable-looking edifice is the crypt, which contains seven large chapels, to which the public is admitted by two important staircases. Above ground the church has an appearance which is rather difficult to describe. It appears to be planned as a great circular interior surrounded by a series of vaulted chapels of immense height; the walls between the chapels, radiating from the centre of the monument, will eventually serve to support the thrust of the immense dome. The method of construction is certainly mediæval, although the plan of the church can hardly be said to belong to the style. At one side of the building is a square nave with two flanking towers of great height somewhat suggestive of the plan of the Dom, Aix-la-Chapelle. The whole style of the building is intended to be an exact copy from the native Catalan. Each of the surrounding chapels is lighted by tall traceried windows of Geometrical design, and the pier walls between the chapels are surmounted by enormous pinnacles, each one a small tower with crocketed spire. This remarkable church is at present but half completed; it is being built in a curious way—each of the immense chapels surrounding the rotunda seems to be completed as funds come in, and it may be years before the central dome is executed. At present five of the chapels stand exposed to view both inside and outside, and, with the unfinished nave and towers, form a singular landmark in the midst of the new suburbs. The church when completed will perhaps have an appearance of competing in general character and dimensions with the cathedral of Gerona, but on a circular plan instead of a square.

Nearly fifty churches and monasteries are said to have been destroyed in Barcelona during the recent rioting. Many of these institutions would be small buildings of no importance—more



Sketch Plan, Barcelona.

Scale of about one mile.



Bridge over the Llobregat, near Barcelona.

or less mere private houses. The larger examples of modern churches thus ruined were no great loss to art, for the typical modern Spanish church is usually as deplorable an example of "church-furnishers' Gothic" as can be found in any other modernised country.

The enormous destruction of church property by a frenzied mob animated by the most futile of motives will give scope for a large amount of rebuilding. The desecrated churches and convents will doubtless be replaced in course of time, and perhaps before very long the money which always flows into such channels with a sentiment of expiation will amply replace all that has been ruined. It will be interesting to see if any particular means against a repetition of such scenes as Barcelona has just passed through will be employed by the rebuilders of the ruined properties.

A kind of class hatred seems to have been the principal cause of the Barcelona revolution. The mob was composed of the lower working-classes, and the motive assigned for the destruction of some fifty religious institutions was a certain immunity from taxation, and other privileges which the clergy still enjoy in Spain. It may not be unjustifiable to conclude that the rigid regularity and "classification" which necessarily divides a community in one of these modern rectangular cities into its component parts apportioned to different districts may accentuate the divisions between the different grades of society. The anarchists attacked the religious class to begin with, because it was the most easily distinguishable; the revolution was fortunately suppressed before other classes of the community had begun to suffer very severely.

As already remarked, the two great mediæval monuments of Barcelona—the XIVth-century cathedral and the church of S. Maria del Mar—are perhaps untouched. The cathedral, which recalls the plan of our Exeter, with its transeptal towers, is at present being completed by the addition of a west front. This, which will certainly be a great improvement to the building, is being carried out in accordance with some mediæval designs for the purpose which still survive. The style is of the XVth-century Geometrical, which the modern Spaniards seem apt enough to imitate with a certain fidelity. The cost of the work is borne by a single munificent benefactor to the church.

As pointed out by Street in his "Architecture of Spain," there is a curious approximation in the plans of Barcelona and Exeter cathedrals, and the episcopal thrones in the two churches have also some slight resemblance. Barcelona Cathedral seems to be the only one in Spain retaining its mediæval choir with a western entrance from the nave.

THE TRADE UNION CONGRESS.

THE forty-second Congress of Trade Unions, the first to be held at Ipswich, has not been marked by any features of special importance. Year by year these Congresses lose little by little any characteristic of discussions relating to trade, and assume the nature of political meetings. This year there were fewer delegates than assembled last year at Nottingham—495, as compared with 518—but the membership of the Unions they represented remains much the same, viz., 1,701,000, as compared with 1,776,000.

Perhaps the most striking feature of the Congress may be said to be found in its negative characteristics. The Congress recognised that the country has been passing through a period of great trade depression, and that the coming winter may witness a repetition of the serious want of employment experienced last year, yet we find no discussion raised as to the best means of stimulating productive employment and increasing the resources upon which labour must depend, no reference to co-operative principles or to anything likely to promote industrial activity, but rather a grudging attitude towards the eleemosynary schemes that have been promoted to meet a time of distress. Perhaps this is hardly to be wondered at when Parliament and the nation are taking the same attitude, but all the

same it is not a wholesome symptom. Thus the Parliamentary Committee have urged the Prime Minister to "take immediate steps to promote large and comprehensive schemes of work of public utility so as to provide large numbers of people with employment, and thereby minimise the distress as far as possible," and the Prime Minister has replied that a palliative must still be sought in the provision of work by the Central Unemployed Body and the Distress Committees. Relief Works and Distress Committees are a sorry last resort for the highly-skilled labour represented by the Unions, even if, as was suggested in the Report of the Local Government Board on Unemployment, they do not tend to increase rather than diminish the numbers out of regular employment (see the *Builder*, August 28 last), and Mr. Keir Hardie's reception of the Development Bill, as meeting the demand of the Labour Party for the recognition of the principle of "the right to work," is not without significance.

Again, the attitude of the Congress towards the new Labour Exchanges is not satisfactory. These Exchanges are to be founded to assist the circulation of employment amongst all classes and to give mobility to labour, but the Trade Unions would appear to use them solely for their own ends. Thus a resolution was carried unanimously, "That no system of Labour Exchanges will be satisfactory unless Boards of Administration are composed equally of representatives of recognised Trade Unions and Employers, with a neutral Chairman appointed by the Board of Trade; and, further, that provision be made to prevent these Exchanges being used to undermine the Trade Union rates and conditions of working by the supplying of labour at less than the Union rate. That under no circumstances shall these Exchanges be used as agencies for the supply of labour to assist any firm who may have a dispute with their workpeople." As, according to Mr. Keir Hardie, in Great Britain and Ireland there are some 14,000,000 wage-earners eligible to become members of Trade Unions, of which only about 3,000,000 are actually members of Trade Unions, it is obvious that Labour Exchanges should not be delivered over to the Unions or used by the minority as a means of controlling the majority. The Parliamentary Committee did not advocate the Labour Exchanges being closed during trade disputes, but the debate disclosed the fact that the Committee entertain the hope that the Exchanges may be of service to the Unions in controlling what they term "blackleg labour."

The scheme of State insurance is at present so nebulous that little can be said about it, but from the observations of one speaker at the Congress, at least there are indications that, as in the case of Old Age Pensions, an effort will be made on the part of some of the "workers," or perhaps we should rather say some of the "talkers," to prevent any contributions on the part of labour. One satisfactory note was struck showing some spirit of independence when a resolution to ask the Government for grants in aid to Unions giving out of work benefits was defeated.

It might have been thought that the persons who held themselves out as representing the interest of labour would have shown some disquietude at the vast increase in the number of Government officials which is necessitated by the new policy of State interference, the salaries of whom are entirely unproductive and divert capital from productive channels, but it is a melancholy fact that the distinction between productive and unproductive expenditure is being lost sight of by all classes, and that whilst capital is discredited thrift in every form is being discouraged.

The resolution in favour of an eight-hour day, as might have been anticipated from past experience, was carried, but a resolution affirming the principles of arbitration and conciliation, both voluntary and compulsory, and to present a Bill with this object to Parliament, was lost.

Unemployment may be due, to a certain extent, to bad trade and general depression, but it is seriously contributed to by the general want of confidence engendered by attacks on capital, extravagant and non-productive schemes, artificial restraints of trade, and a lack of patriotism and self-dependence which discourages thrift.

NOTES.

Thorwaldsen's Lion. It should be a matter for world-wide regret, and that on more counts than one, that Thorwaldsen's celebrated lion carved in the rock at Lucerne is reported to be in a nearly hopeless process of effacement by the action of the weather. In the first place, it is the memorial of a noble sacrifice to duty; in the second place, it is undoubtedly the finest thing which Thorwaldsen—a sculptor somewhat over-estimated in his own day—ever produced. In the inspiration derived from celebrating an act of heroism he for once forgot his second-hand classicism, and produced a work which is modern, simple, grand, and original. The moral of the matter seems to be—if you wish to carve a perpetual memorial out of living rock, do not select sandstone. Can nothing be done? Why not try an application of Szerelmey's stone liquid to the surface of the sculpture?

The American Report on Reinforced Concrete. At the annual meeting of the American Society of Civil Engineers the Report of the Special Committe on Concrete and Reinforced Concrete was brought up for consideration. Several members then read discussions which will be published in the *Proceedings* for September, and other members briefly stated their views. So far nothing has been said which tends directly towards the improvement of the proposed regulations, although the criticism evoked will probably be useful as a guide to the Committee. On the motion of Professor L. J. Johnson it was decided that the Report should be taken as one of progress and that the work of the Committee should be continued. Consequently the Report and (as we read the *Proceedings* of the annual meeting) the minority Report also will be printed and circulated among the members of the Society. The Special Committee will doubtless receive a good many useful suggestions, and we hope that the final Report may prove to be a document fully deserving the confidence of engineers and architects, and at the same time reflecting credit upon the important Societies and Associations jointly concerned in its production.

The Strength of Columns. In the *Transactions* of the Institution of Civil Engineers of Ireland Dr. Lilly describes the experiments conducted by him at Trinity College, Dublin, with the object of determining the constants to be used in formulæ for the design of solid cylindrical round-ended columns. One point worthy of note is that, although the Rankine-Gordon formula is an empirical one, and the method of deriving it more or less irrational, Dr. Lilly finds that the equation for solid columns is justified in its use, and errs on the side of safety. For hollow columns the Rankine-Gordon formula in less suitable, and, as shown by the previous investigations of the author, a new term is required to express the phenomena of secondary flexure. Another paper in the same volume of *Transactions* is one read by Dr. Cowan, M.Inst.C.E., and entitled "Notes on Modern Road-Making." These notes have been collated from various sources and embody the ideas of the author for the general improvement of roads in Ireland. The most urgent necessity in that country is money for the purpose of enabling county and other highway authorities to apply methods such as those enumerated and advocated by the author.

Walnut Lane Bridge, Philadelphia. In the *Proceedings* of the American Society of Civil Engineers, Mr. George S. Webster and Mr. Henry H. Quimby give a long and fully-illustrated description of the reinforced concrete bridge over the Wissahickon Creek, Philadelphia. The type of structure selected is that of the Luxemburg masonry bridge, which is virtually two bridges side by side and connected by a platform. The Walnut Lane Bridge comprises a central arch of 233 ft. and five end arches each of 53 ft. span. The main arch with the rise of 70 ft. 3 in. carries the roadway at the height of about 147 ft. above water-level, and consists of arch ribs with spandrel columns surmounted by small arches for support of the roadway. The end arches have spandrel walls of the usual type. It was found that the lowest initial cost would have been secured by a steel viaduct with timber decking, but the character of the surroundings rendered a structure of that kind quite inappropriate. Moreover, the possibility of future neglect of maintenance emphasised the necessity of adopting the most permanent form of construction. Owing largely to the satisfactory experience gained in Philadelphia of concrete bridges it was decided to adopt reinforced concrete as the structural material for the new bridge, which is

remarkable as including the longest arch of its kind hitherto built, as well as for the admirable design and proportions embodied.

Fineness and Strength of Cement.

OTHER things being equal, the strength of Portland cement is proportionate to its fineness, but it is very necessary for the user to make close inquiry into the parity of the other things involved. Underburned clinker is readily ground into cement of exceeding fineness unaccompanied by the strength and other properties desired. The Reports of Mr. George S. Webster, City Engineer of Philadelphia, show that since the year 1904 the fineness of all brands of cement tested by him before use on public works was represented by the average residue of only 18 per cent. on a 100-mesh sieve and less than 25 per cent. on a 200-mesh sieve as required by the standard specification of the American Society for Testing Materials. Nevertheless, the tensile tests of the same cements exhibit results of extremely variable character bearing out the statement that the finest-ground cement is not necessarily the strongest. While not underestimating the value of fine grinding we may point out that the most important factors to be considered by the architect are tensile strength in the 1 : 3 sand test, permanency, and constancy of volume. Fineness is an additional merit, but, as shown by Mr. Webster's reports, it must not be accepted by itself as a criterion of strength.

Electric Water-Heater.

A DEVICE for heating water electrically for domestic purposes which has been perfected by Messrs. Spagnoletti, of London, is at present exciting great interest amongst electricians. The apparently almost insuperable drawback to the use of electricity for heating is the cost. A whole unit of electricity converted into heat will at the most only give two gallons of boiling water, and at the present prices ruling in London this is practically prohibitive. Messrs. Spagnoletti have shown how by the help of their device supply stations will be enabled to quarter their present prices. The consumers are supplied with a current of electricity which is always flowing and heating a "Therol" water-heater. In its simplest form the apparatus consists of a block of iron, which stores most of the heat generated, cast round a coil of pipe. At the top of the block the heating coils, which are insulated with mica, are inserted. Layers of magnesia form a suitable heat-lagging for the block, which is being continually heated by the electric currents flowing in the coils. By moving a tap suitably either cold, tepid, or hot water can be obtained. There are no noxious gases, and no flue or chimney is required. When current is required for lighting or cooking the required amount is diverted from the heating apparatus. We think that the great advantages of the system are that the consumer knows exactly what he has to pay, and the engineer could run his station with maximum economy. No meters would be required. Further, improvements in lamps would not necessitate the Supply Company raising the price, and domestic labour would be lightened. Some problems have still to be settled. For example, the ordinary householder does not use the same amount of hot water in summer and winter. Assuming, however, that the device will stand rough usage, a distinct advance has been made in the applications of electricity.

A Note at Bruges.

A CORRESPONDENT writes:—"With a thoroughness that does credit to the artistic tastes and the justifiable pride of the Brugeois in their ancient architectural gems, a fresh step has recently been taken in that city, this time on the Bourg—nothing less than the demolition of the painted plaster front of the Palais de Justice, to make way for a façade in the local style of architecture, based, as far as possible, on the charming model of the Palais des Comtes de Flandre that overlooks the canal at the rear. It is certainly time the disfigurements of that side of the Bourg were removed; and when that eyesore's successor is completed, may we hope that the Yzergietery alongside the beautiful staircase to the Chapelle du Saint Sang will also have its hideous front treated in the same way as is now being done to the Palais de Justice. Probably the celebrated Zandvoorde bricks are being used in the new front of the Palais de Justice."

Houses of Historical Interest.

MEMORIAL tablets have recently been affixed upon "The Cedars," Portway, West Ham, E., the home of Mrs. Elizabeth Fry; No. 1, Moreton-gardens, South Kensington, the home of Madame Goldschmidt ("Jenny Lind"); No. 70, Knightsbridge, overlooking Hyde Park, where Charles Reade lived; St. Philip's Vicarage, Stepney, the home of the Reverend John Richard Green; and No. 28, Herne-hill, where John Ruskin lived in his early life. Hawthorne's "House of the Seven Gables" at Salem, Massachusetts, has been bought for the purposes of a settlement; it was built in 1662, and was altered about forty years ago, when it was shorn of some of the gables. It is proposed to open a fund for the purchase of the house at Blantyre, Lanarkshire, which was the birthplace of David Livingstone, and to preserve as a memorial museum.

THE STRENGTH OF RIVETED JOINTS.

IN every steel structure the strength of riveted joints is a consideration of primary importance, and one which will appeal more than ever to architects when steel-framed buildings are completely recognised by the amendment of the London Building Acts, as proposed by the County Council. While the effective resistance of a riveted member is furnished by the friction of the plates and the shearing strength of the rivets, the usual plan is to consider the latter as the governing factor. The resistance of rivet steel in shear is taken at about four-fifths of its resistance in tension, and a factor of safety is applied so that the working stress shall not exceed, say, one-fifth of the ultimate strength of the metal. But it is worth remembering that the elastic limit of steel in shear is far lower than the elastic limit in tension, and that in consequence the metal would commence to deform under shearing stress of intensity not very much greater than the working stress customarily assumed to be safe.

The saving clause, in practical work, is that the resistance actually operating is that due to friction of the plates rather than the shearing strength of the metal. If the latter were relied upon alone the effect would probably be gradual shearing of the rivets and rapid deterioration of the joints. The fact is that metallic structures have generally to withstand shocks in addition to the purely statical loads upon which calculations are based. Hence, to provide for permanent endurance it is necessary that the stresses due to shocks should be elastically absorbed in order to obviate permanent local deformation.

Considering a joint where friction of the plates is adequate for the resistance to the forces developed, the assembled plates form a solid mass capable of absorbing shock in an effective manner, the maximum strain per unit of volume being relatively small, and therefore causing no permanent deformation.

On the other hand, in a joint where resistance is afforded by rivets, acting simply as pins, there is great risk that the elastic resistance of the rivets would be insufficient for the absorption of shock, and that the edges of the holes in the plates would cut into the shank of the rivets. The only way of obviating such effects would be to employ rivets of very ample collective area—a costly and inconvenient remedy.

From the foregoing it is evident that the friction between the plates of a riveted joint is an important factor, and one whose value together with the values of the factors causing variation are well deserving of study.

A series of very careful tests has recently been completed by M. C. Fremont on the strength of riveted joints, his investigation having been directed mainly to the effects of friction between the plates, or, as we may briefly say, the adherence of the riveted parts. The results of the tests in question are fully stated in the *Bulletin* of the *Société d'Encouragement pour l'Industrie nationale*, from which the subjoined notes have been collated.

In all investigations of the kind it is difficult to arrange things so as to obtain results showing adherence, without the risk of serious errors. The method of M. Fremont was devised with a special view to the avoidance of similar causes of error, and is briefly described below.

In order to enable him to determine the adherence produced by a rivet, M. Fremont conceived the idea of causing the sliding of the connected plates by rotation about the axis of the rivet, thus eliminating the resistance of the rivet to shear. As shown in Fig. 1, the plate *a* was placed between

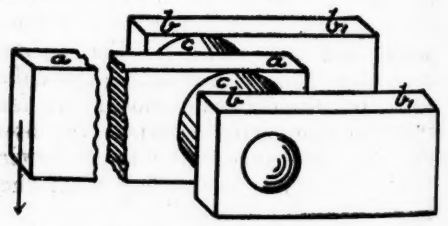


Fig. 1.

two other plates *b*, but separated from them by two collars, *c*, the five pieces being connected by one rivet, inserted under hydraulic pressure.

During the conduct of tests the arrangement was held horizontally while weights were successively added to a tray suspended from the end of the plate *a*.

The adherence caused by the pressure of the rivet was calculated by a simple mathematical process which we need not here repeat.

The tests of riveting were conducted with rivets taken from a collection of seventeen samples of metal, one specimen being of

wrought-iron and sixteen of mild steel with the ultimate tensile strength of from 22¼ to 42½ tons per square inch. In every case the tensile strength and elastic limit of the metal were carefully determined, and from the samples of metal rivets were made, these being heated before use throughout their entire length to about 930° C., and put in place under the hydraulic pressure of 50 tons.

Several tests were made with rivets of the same metal by maintaining the pressure sometimes for two or three seconds, and sometimes for as long as sixty seconds. By means of a stop the movement of the lever *a* could be arrested where desired so as to permit several successive slidings of the metal to be effected. The results of the tests are given in Table I., where the frictional resistance to slipping is given in tons per square inch of the cross-section of the rivet:—

gation of M. Fremont is that in the case of rivets in double shear, as when connecting three plates, the frictional resistance of the joint is less than that of two plates connected by rivets in single shear. The following results stated by M. Fremont make clear the superior adherence of two plates, the weight in kilogrammes being that applied at the end of the bar *a* (Fig. 1).

	Two Plates. Kg.	Three Plates. Kg.
Iron rivet connecting rough plates ...	125	... 80
Iron rivet connecting polished plates ..	100	... 67
Steel rivet connecting rough plates ...	140	... 125

These results may be explained by the circumstance that when two plates are riveted together there is less space between them than between three plates; consequently the contraction of the rivet causes more pressure on the metal and therefore greater frictional resistance. Moreover, the rivet heads are very securely moulded upon

TABLE I.—FRICTIONAL RESISTANCE OF RIVETED PLATES IN TONS PER SQUARE INCH OF RIVET SECTION.

No. of Metal.	Kind of Metal.	Tensile Strength of Metal.	Elastic Limit of Metal.	Duration of Riveting Pressure.	Frictional Resistance during Successive Slippings of the Plates.			
					1st.	2nd.	3rd.	4th.
		Tons per Sq. In.	Tons per Sq. In.	Seconds.				
1	Iron ...	25·8	14·9	3	4·44	3·93	3·93	3·78
				60	4·44	3·93	3·93	3·78
2	Steel ...	23·5	13·3	3	4·60	4·60	4·60	4·60
				60	4·10	4·28	4·44	4·44
3	do. ...	27·0	15·2	3	4·64	4·28	4·64	4·44
				60	4·79	4·44	4·64	4·44
4	do. ...	29·5	17·0	3	6·85	5·15	5·30	5·45
				60	6·16	5·45	5·30	5·08
5	do. ...	31·1	17·4	3	7·87	6·03	6·50	5·45
				60	6·67	7·30	6·67	7·17
6	do. ...	27·5	16·7	3	4·80	4·80	4·80	4·80
				60	7·52	6·50	6·50	5·81
7	do. ...	25·3	22·0	3	2·13	2·13	2·06	2·06
				60	5·15	4·50	4·95	2·06
8	do. ...	25·9	16·0	3	4·95	4·44	4·44	2·06
				60	7·87	5·45	5·81	5·45
9	do. ...	25·4	16·6	3	6·16	5·15	5·15	5·15
				60	6·67	5·81	6·15	6·47
10	do. ...	36·2	22·7	3	0·51	0·51	0·51	0·51
				60	4·13	3·43	3·58	0·51
11	do. ...	22·1	14·2	3	5·14	4·44	4·44	4·44
				60	4·95	4·64	4·80	4·44
12	do. ...	22·9	11·6	3	4·60	3·93	4·09	4·44
				60	5·30	4·95	4·13	4·13
13	do. ...	29·9	15·9	3	6·00	4·80	5·15	4·80
				60	6·85	6·00	5·81	4·80
14	do. ...	32·4	14·7	3	6·50	5·65	5·81	5·65
				60	8·22	6·85	6·85	6·85
15	do. ...	22·7	11·0	3	4·44	4·28	3·81	6·85
				60	4·80	3·93	4·28	4·28
16	do. ...	30·1	13·6	3	8·57	5·15	5·65	5·34
				60	8·25	6·50	7·21	6·48
17	do. ...	42·6	27·6	3	0·00	0·00	0·00	0·00
				60	6·50	5·84	6·00	5·85

It is worthy of remark that the manner in which slipping of the plate took place during the tests was manifested in two different ways. Sometimes the first movement was sudden under a given load, and in the succeeding tests of the same joint the movements were caused by a smaller load. At other times the movement of the loaded plate was gradual and occasionally ceased while still under the originating load, the addition of more weight being necessary to cause further movement. These variations were evidently due to differences in the condition of the surfaces in contact.

The greater resistance almost invariably characterising the first movement in each series of tests is probably attributable to the fact that the initial pressure of the riveting-machine, being two or three times as much as that represented by the contraction of the rivet, had bonded the irregularities of the surfaces so as to give supplementary resistance which was destroyed by the first movement.

For average qualities of mild steel, the frictional resistance of the joints tested by M. Fremont may be taken approximately at about 5 tons per square inch, or roughly rather more than half the value commonly stated as the result of experiments in this country. The discrepancy is doubtless accounted for by the circumstance that the latter probably include some part of the resistance of the rivets in shear.

Another point made clear by the investi- and more or less impressed into the outer surface of the plates.

Table I. shows very clearly the considerable variations of frictional resistance exhibited by riveted joints. The investigation of M. Fremont has afforded new data for determining the influence of the chief factors causing variation, chief among them being:—

1. Temperature of the rivet.
2. Elastic limit of the rivet iron or steel.
3. Condition of the plate surfaces in contact.
4. Planeness and number of the plates riveted.
5. Duration of riveting pressure.
6. Intensity of riveting pressure.
7. Length of the rivet.

(1) *Temperature of the Rivet.*—Experiments made with iron rivets of metal from the same bar showed the temperature of 900° C. insured frictional resistance equal to that given by heating the rivets up to 1,300° C. The reasons accounting for this effect may be thus briefly stated. The contraction of the rivet on cooling is greater when the temperature is higher, but as the elongation of the shank is relatively greater in proportion to the volume of metal, the hole is less effectively filled, while the ductility of the metal may be appreciably reduced.

Effective pressure upon the plates is best secured by moderate heat, the temperature recommended by M. Fremont being 900° C.

(2) *Elastic Limit of the Rivet Iron or Steel.*—The elastic limit of the metal after riveting is a most important factor, for upon it depends the effective frictional resistance of a joint. The only exceptions to this rule are those due to the employment of high-tension steel such as Nos. 7, 10, and 17 in Table I.

Omitting these from consideration, we have in Table II. a comparison of the elastic limits for iron and various qualities of mild steel, with the frictional resistance of joints, the elastic limit being in each case that ascertained after riveting:—

TABLE II.—ELASTIC LIMITS OF RIVET METAL AND FRICTIONAL RESISTANCE OF JOINTS IN TONS PER SQUARE INCH.

No. of Metal.	Kind of Metal.	Duration of Riveting Pressure.	Elastic Limit of Metal.	Frictional Resistance.
		Seconds.	Tons per Sq. In.	Tons per Sq. In.
1	Iron ...	3	18·1	3·93
		60	—	—
2	Steel ...	3	17·0	4·60
		60	—	—
3	do. ...	3	18·4	4·44
		60	—	—
4	do. ...	3	21·7	5·30
		60	—	—
5	do. ...	3	25·7	6·03
		60	25·0	6·98
6	do. ...	3	21·2	4·80
		60	27·3	6·50
8	do. ...	3	19·5	4·44
		60	19·7	5·45
9	do. ...	3	20·5	5·15
		60	18·1	6·03
11	do. ...	3	18·1	4·44
		60	18·8	4·76
12	do. ...	3	15·2	4·00
		60	16·4	4·54
13	do. ...	3	20·1	5·08
		60	23·7	5·84
14	do. ...	3	20·7	5·72
		60	28·2	6·86
15	do. ...	3	16·5	4·13
		60	15·9	4·28
16	do. ...	3	19·2	5·60
		60	21·0	6·73

The foregoing table indicates that the ratios of frictional resistance to the actual elastic of the metal are 1 : 4 for 3 seconds of riveting pressure and 1 : 3·7 for 60 seconds of riveting pressure.

(3) *Condition of the Plate Surfaces in Contact.*—As the adherence of the plates depends upon friction it necessarily increases with the roughness of the surfaces. Table III. gives a selection of results bearing upon this point:—

TABLE III.—FRICTIONAL RESISTANCE OF ROUGH AND POLISHED RIVETED PLATES (three iron plates 15 millimetres thick, rivets in No. 2 steel).

Duration of Riveting Pressure.	Frictional Resistance.	
	Rough.	Polished.
Seconds.	Tons per Sq. In.	Tons per Sq. In.
3	3·90	2·41
60	5·46	3·18
120	6·35	4·06

(4) *Planeness and Number of the Plates Riveted.*—In order to secure the best results it is necessary that the plates should make contact at all points, otherwise, although brought together by elastic deformation under the pressure of the riveting-machine, they will draw apart, elongating the hot shank of the rivet and so reducing subsequent frictional resistance to practically nothing. The importance of securing perfect contact is in direct proportion to the number of plates riveted together.

(5) *Duration of Riveting Pressure.*—The figures in Table II. indicate that the duration of 60 seconds gives frictional resistance of about 10 per cent. greater than that obtained by maintaining the pressure for 3 seconds only. The advantage is more marked when the length of the rivets is relatively small and a considerable reduction takes place in the collective thickness of the plates subjected to pressure.

(6) *Intensity of Riveting Pressure.*—Where the diameter of the rivets is not above 1 in. and the steel is of the quality usually employed in structural work, the

riveting pressure of 40 to 50 tons is ample. Any increase would add little or nothing to the frictional resistance, besides involving risk of injury to the metal riveted.

(7) *Length of the Rivet.*—In most cases the pressure upon the plates is the more effective as the length of rivet is increased for a constant thickness of metal connected, or as the thickness of metal connected is reduced for a constant length of rivet. This conclusion points to the result that large diameter rivets connecting thick plates are not well calculated to promote frictional resistance because the plates are not drawn together so effectively as could be desired.

As pointed out at the commencement of this article, the frictional resistance of a riveted joint should be adequate for all working stresses. Nevertheless, the resistance of rivets to shear is at once an interesting and desirable subject for study. One series of experiments by M. Fremont was made with rivets of steel No. 12, having the tensile strength of 22·9 tons per square inch, its resistance to *single shear* between two parallel steel plates being 12·5 tons per square inch. In testing the same metal in the form of a pin inserted in a hole through three plates, its resistance to *double shear* was found to be 15·86 tons per square inch. The same quality of steel employed as a rivet in *double shear* without heating was found to give the shearing resistance of 22·2 tons per square inch. Finally, a rivet of the same metal in *double shear* and applied after heating gave the shearing resistance of 25·5 tons per square inch.

The apparent anomaly presented by the greater value of resistance to shear as compared with resistance to tension is accounted for by the fact that the tensile strength and elastic limit of iron and steel are increased by mechanical and thermal treatment. This point is made clear by the results summarised in Table IV., where the increases are fairly normal with the exception of the high-carbon steel denoted by Nos. 7, 10, and 17 :—

TABLE IV.—TENSILE STRENGTH AND ELASTIC LIMIT OF IRON AND STEEL BEFORE AND AFTER USE IN THE FORM OF RIVETS.

No. of Metal.	Kind of Metal.	Duration of Riveting Pressure.	Tensile Strength.		Elastic Limit.	
			Original.	After Riveting.	Original.	After Riveting.
			Tons per Sq. In.	Tons per Sq. In.	Tons per Sq. In.	Tons per Sq. In.
1	Iron	3	25·8	26·7	14·9	18·1
2	Steel	3	23·5	27·5	13·3	17·0
3	do.	3	27·0	26·7	15·2	18·4
4	do.	3	29·5	32·4	17·0	21·7
5	do.	3	35·1	40·4	17·4	25·7
		120	35 1	40·1	17·4	25·0
6	do.	3	27·5	34·1	16·7	21·3
		60	27·5	36·7	16·7	27·3
7	do.	3	35·6	50·8	22·0	38·2
		60	35 6	62·8	22·0	46·2
8	do.	3	25·9	31·7	16·0	19·5
		60	25 9	31·8	16·0	19·7
9	do.	3	25·4	29·5	16·6	20·5
		60	25·4	28·1	16·6	18·1
10	do.	3	36·2	59·9	22·7	38·1
		60	36·2	90·7	22·7	73·0
11	do.	3	22·1	28·4	14·2	18·1
		60	22·1	27·5	14·2	18·8
12	do.	3	22·9	26·4	11·6	15·2
		60	22·9	28·1	11·6	16·4
13	do.	3	29·9	35·1	15·9	23·1
		60	29·9	36·7	15·9	23·7
14	do.	3	32·4	39·3	14·7	20·6
		60	32·4	44·3	14·7	28·2
15	do.	3	22·7	25·9	11·0	16·5
		60	22·7	27·0	11·0	15·9
16	do.	3	30·1	33·2	13·6	19·2
		60	30·1	36·4	13·6	21·0
17	do.	3	42·6	61·0	27·6	51·7
		60	42·6	78·8	27·6	64·9

If the rivet steel is softer than the plates the result is shearing of the rivet, as shown in Fig. 2. If the rivet steel is harder than the plates the result is deformation of the hole accompanied by comparatively little deformation of the rivet, as represented in Fig. 3. If the rivet and the plates are of equal hardness the general effect is that illustrated by Fig. 4.

The three diagrams are from photographs taken by M. Fremont, who recommends the employment of fairly hard steel for rivets, and the adoption of small diameters with the object of reducing deformation in the holes through the plates. In this connexion we may mention that the steel employed for rivets in the Forth Bridge had the tensile strength of about 27 tons per square inch, corresponding approximately with that of

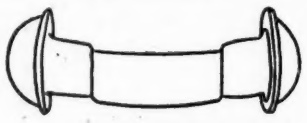


Fig. 2.

steels Nos. 3 and 6 in Table I. The use of softer metal reduces the efficiency of the joint, while exceptionally hard metal gives no advantage in the way of frictional resistance, and tends to damage the plates if shearing action comes into play.

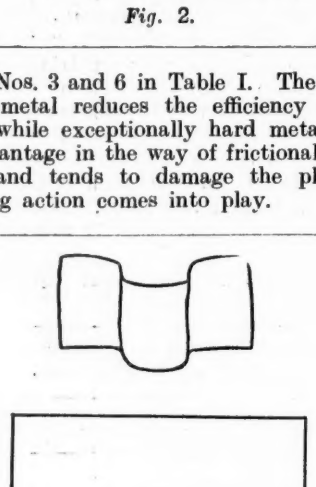


Fig. 3.

The investigation of M. Fremont into the form of rivet heads points to the conclusion that rupture usually takes place along the frustum of a cone such as *f d d, f* (Fig. 5), having the section of the rivet for base and the generatrix inclined at the angle of from 70 to 75° with the base. The finished head of the rivet should envelop this cone to such thickness that the resistance to shear along the surface of the cone shall be not less than that of the rivet shank. Hence the rational profile of a rivet head should be the "basket-handle" curve. But the preparation of dies so shaped would not be easy, and as an increase of height is advantageous for practical reasons, the hemispherical or snap head is to be preferred. With the radius of two-thirds the diameter of the shank, the profile becomes that represented in Fig. 5 by the curve *g c g*, but M. Fremont recommends the modification denoted by the tangents *n h, n, h*, with the object of distributing the pressure of the die over a wider area.

The other profiles in Fig. 5 are those of ordinary segmental rivet heads. The curve

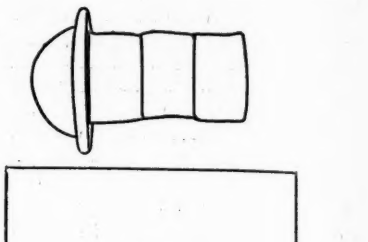


Fig. 4.

k c k has the height of two-thirds the shank diameter, the width of five-thirds the shank diameter, and the radius of 0·86 the shank diameter, and represents a profile in common use. The two other curves *k b k* and *k a k* represent the heads of rivets tested by M. Fremont.

The rivet *k b k*, with the height of the head equal to 0·56 times the shank diameter, failed in the shank and exhibited permanent deformation at a comparatively early stage.

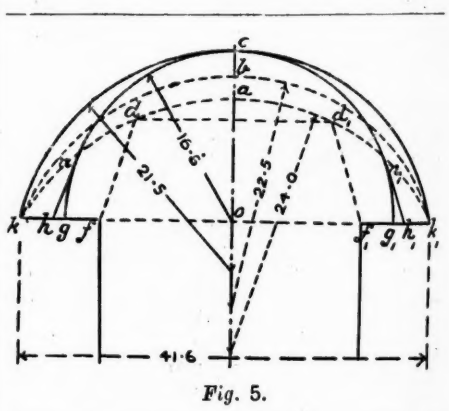


Fig. 5.

The rivet *k a k*, with the height of the head only 0·48 times the shank diameter, was ruptured along the frustum of the cone *f d d, f*, thus showing the necessity for an ample thickness of metal.

Taken as a whole, the investigation of M. Fremont is one of much value, and the data furnished hereby are specially interesting to architects at the present time in view of the extended use of riveted joints that will be encouraged by the amendment of the London Building Acts.

POLICE-STATION, SUTTON-IN-ASHFIELD. — The contract for the erection of a new police-station for Sutton-in-Ashfield has been let by the Notts County Council to Messrs. F. Perks & Son, of Mansfield. The site for the new building is in Brook-street. The structure will have a frontage of 96 ft., and its length will be 108 ft. It will comprise an inspector's residence and an inspector's office, charge-room, and guard-room. Provision will be made for four cells, with an airing-court adjacent. At the rear there will be a drill-yard. The front elevation will be built of stone and the remainder of brick. The cost is estimated at upwards of 3,000*l*. The architect is Mr. L. Maggs, F.S.I., Shire Hall, Nottingham, and clerk of works Mr. Bolton.

BLACKFRIARS BRIDGE WIDENING.

On Tuesday the Lord Mayor formally dedicated to public use the new construction which has been added along the upstream face of Blackfriars Bridge by the Corporation of the City of London.

The original structure by Cubitt comprised five wrought-iron arches, 75 ft. wide, carried on masonry abutments and river piers. When the County Council proposed, a few years ago, to extend their tramway lines across the river to meet the Victoria Embankment tracks, the City Corporation made no objection beyond stipulating that the bridge should first be widened, a work which they undertook to perform free of cost out of the funds at disposal in the Bridge House Estates.

The project was submitted to Sir Benjamin Baker, who prepared the scheme which has recently been carried to completion under the superintendence of Mr. Basil Mott. Briefly stated, the engineering works involved were:—The extension of the abutments and river piers for the distance of 30 ft. towards the west, the transfer of four original exterior arch ribs, and the cast-iron parapets to the face of the new masonry, the addition of steel arch ribs between the original work and the new position of the old arch ribs, the addition of one steel arch rib at the exterior of the northern shore span, the construction of new decking roadway, and a footwalk over the additional width, the laying of up and down tramway lines, and various incidental works.

The first operation of widening the river piers was commenced in 1907 by Messrs. W. Arrol & Co., the general contractors, who sank four steel caissons, by whose aid the foundations were formed, the caissons being filled up with concrete, and upon the solid basis so provided the masonry piers were built up to the required height. During the operation of sinking the caissons a serious accident took place, upon which we have previously commented, but all four caissons were finally set in position.

When the new masonry was ready, four of the old arch ribs were lifted bodily by a large gantry mounted on wheels running upon rails laid transversely to the main axis of the bridge, and were finally deposited on their new bearings. As the weight of the ribs ranged up to 150 tons each, it will be understood that the work of removal was by no means child's play, its achievement without a single hitch being a matter upon which the technical advisers and staff of the contractors are to be congratulated.

The exterior rib of the northern shore span was constructed of steel in order to provide more adequately for the strains involved by the curved sweep of the tramway towards the Embankment. This steel rib was assembled on a timber staging built up from the river-bed and placed on its seating after the abutment had been widened and brought to the required form. The latter was an operation necessitating the utmost care in order to avoid the risk of injury to the adjacent tunnel of the District Railway. The addition of the new intermediate arch ribs and decking was a comparatively simple undertaking, as also were the construction of the road and foot ways and the laying of the tramway lines, the last-mentioned having been entrusted to Messrs. Dick Kerr & Co., as sub-contractors. We may here mention the fact that the lines across Blackfriars Bridge are the property of the City Corporation, by whom running powers have been granted to the County Council.

By the opening of the new works another north and south tramway connexion is made, two still more important results being the final abolition of the highly inconvenient terminus in the middle of Blackfriars Bridge-road, and the conversion of all the southern lines passing over Westminster and Blackfriars bridges into loops, along which traffic will proceed continuously. The change will place a double service of vehicles at the disposal of many passengers, and will distribute the morning and evening crowds over a fairly long line instead of encouraging concentration at two points as heretofore.

A further valuable detail connected with the Blackfriars Bridge extension is the construction of the new subway at the junction of Queen Victoria-street, the Embankment, and New Bridge-street, these works having been placed in the hands of Messrs. Perry & Co.

The bridge improvement and subways involve an expenditure of more than a quarter of a million, to which the ratepayers are not asked to contribute a single penny. Therefore they have even more reason than the remaining millions inhabiting Greater London for gratitude to the City of London, and for congratulating themselves on the continued existence of funds enabling the Corporation to play the part of a fairy godmother in so satisfactory a manner.

THE WORK OF THE ROYAL COMMISSION ON SEWAGE DISPOSAL.

By H. Lemmoin-Cannon, P.A.S.I., etc.

A further voluminous publication, resulting from the eleven years' labours of the members of the Royal Commission on Sewage Disposal, appointed on May 7, 1898, and their staff, is just to hand. When it is considered that this latest Blue Book consists of over 500 closely-printed foolscap pages, containing hundreds of tables of great length and much explanatory matter in connexion, besides other copious details, it will be at once apparent that to attempt to deal in any way adequately with such a subject within the limits of an article is manifestly impossible; to do so would require several months' close study, and the results set forth in a fair-sized volume. We will endeavour, however, to touch upon points of general interest.

The Blue Book before us—being Appendix III., containing memoranda giving the results of observations on various processes of sewage treatment—deals with the observations made on behalf of the Commissioners by their chemists, bacteriologists, and engineers at some twenty-seven sewage-treatment installations during a period of some four years. The methods observed comprised practically all the main processes employed in purifying crude sewage by biological filters practised at the time when the observations were projected, following preliminary treatment by chemical precipitation or septic tank. The treatment of water-carried sewage only was studied, as, the various conservancy methods being considered quite out of date in the light of the more recent methods employed, no advantage could accrue from any attention being paid to them. Sewage farming and treatment by land only was dealt with very fully in the Fifth Report of the Commission, issued in August, 1908; and the conclusions come to by the Commissioners were most emphatic on its value under suitable conditions. In effect they found it quite practicable to purify the sewage of towns by treatment on land by the employment of the micro-organisms present in the soil; and that, provided the soil is suitable and the area of land sufficient, the organic matters present in the sewage can be thoroughly oxidised thereby.

The classes of water-borne sewage dealt with in the observations under consideration were almost solely of a domestic character, save for, in most cases, comparatively small quantities of trade refuse, brewery wastes, and waste liquids from tanneries.

Before entering more fully into a consideration of some of the principal features of the subject, we give the following details, which we have been at some trouble to bring together, feeling they will most likely be the means of creating a greater interest in those readers who may happen to be connected with either of the various districts concerned.

Of the twenty-seven installations dealt with, none are connected with any great centres of population. The largest, that at York, deals with the sewage of some 80,000 persons. Among the larger ones may be mentioned those at Kingston-on-Thames, Rochdale, Exeter, Maidstone, Chorley, Hendon, and Guildford, dealing with the sewage produced by 53,454, 52,000, 38,000, 34,000, 27,000, 23,500, and 16,000 persons respectively. Coming to the smaller works observed, those at Normanton (12,600), Oswestry (9,800), Hampton (6,500), may be mentioned; whilst much less quantities were dealt with at the following places:—Prestolee (Bury Rural District) (500), Caterham Barracks (1,300), Little Drayton (1,550), Hartley Witney (1,600), Withnell (1,650), Clifton (Barton-upon-Irwell) and Hulton (2,000 each), Horfield and Knowle (Bristol) (2,500 and 1,600), Slaithwaite (3,000), and Andover (9,000).

Preliminary Methods of Treatment.

In most cases, on the sewage reaching the treatment installation it is passed into *detritus tanks*, or *grit-chambers*, wherein are screens of coarse or fine mesh, the former being preferable, as they choke less readily. The crude sewage runs through these screens, which succeed in arresting a considerable proportion of the grit road detritus and various suspended matters (paper, pieces of stick, cloths, corks, etc.). The idea is to ensure better oxidation and treatment generally in the precipitation tanks and on the contact-beds or filters, and to prevent choking. These tanks are cleared as often as necessary, some having automatic apparatus for the purpose. They are constructed of brick and concrete of varying size, perhaps 20 ft. by 4 ft. and 4 ft. deep may be considered an average size.

Precipitation.

Where grit-chambers are not employed, the sewage runs directly into the precipitation tanks, where they are used; the actual treatment of the crude sewage commences therein.

Precipitation Tanks.

The tanks at the installations observed are usually rectangular in shape, but in a few instances are circular. Constructed of bricks and cement, they have concrete bottoms. All vary much both in size and depth. Those at York, for instance, are 160 ft. by 40 ft., by 6 ft. 6 in. in depth, with a capacity of 250,000 gallons each; those at Chorley, 90 ft. by 48 ft., by 5 ft. 3 in. in average depth, each with a capacity of 140,000 gallons; at Maidstone, 157 ft. by 28 ft. 6 in., with an average depth of 4 ft. 5 in., and a capacity of 100,000 gallons. Whilst as an illustration of the size of precipitation tanks at a small installation, that at Withnell may be mentioned, where the two tanks are each 44 ft. by 11 ft. 9 in., by about 5 ft. in depth, with a capacity of 16,156 gallons.

The *circular* tanks at Horfield (Bristol) are only 12 ft. in diameter, but very deep (18 ft.), with a capacity of 9,067 gallons each. These are constructed upon the Dortmund plan, being cylindrical to a depth of about 10 ft., and conical from there to the bottom. The sewage is delivered through a pipe into the centre of the precipitation tanks at a depth of 10 ft. (*i.e.*, at the top of the cone), and is then spread by a "bonnet."

The Dortmund tank possesses in some respects distinct advantages over the ordinary rectangular tank, especially as regards the facilities for sludging (*i.e.*, cleaning out the settled solids), and the absence of smell during that process. A deep circular tank of this class is easier and cheaper to cover than a (relatively) shallow rectangular one, occupying, as it does, less surface area; on the other hand, however, it is usually more expensive in cost of construction.

Settlement.

The settlement or breaking up of the solids present in the sewage is aimed at in the preliminary process; and to assist this

it is usual to either add certain chemicals, or the micro-organisms present in the sewage are allowed free play under suitable conditions.

Chemical Precipitation.

In the antiseptic system certain chemicals are added to the crude sewage on its reception at the precipitation or sedimentation tanks, to aid in the settlement of the solids as sludge to the bottom of the tanks, for removal at stated intervals, depending somewhat on the nature of the sewage, and to arrest decomposition.

Some form of chemical precipitation was employed during the official observations at the majority of the installations in question, viz., at York, Kingston-upon-Thames, Maidstone, Normanton, Rochdale, Guildford, Hendon, Calverley, Chorley, Horfield, and Withnell.

As regards the chemical precipitants employed, alumino-ferric (a trade name) is used alone at no fewer than seven of the works observed, among them Guildford, Calverley, Horfield, Normanton, and Hendon, in quantities of 5, 6·7, 8, 15·7, and 17·5 grains to each gallon of dry-weather flow of sewage. At York the alumino-ferric is first used at the rate of 4 grains per gallon, and lime is subsequently added in the form of milk of lime at the rate of 3 grains per gallon.

Alumino-ferric also forms the basis of the precipitant used at Kingston-upon-Thames, in Sillar's "A.B.C." process, in conjunction with blood, charcoal, and clay, some 50 grains per gallon in all—"undoubtedly a very efficient form of chemical precipitation," as the Commissioners say.

Sulphate of alumina has been used alone at Chorley only, in quantities equivalent to about 9 grains per gallon; but a precipitant of a similar kind is now made at the works by treating bauxite with fairly strong crude sulphuric acid, and allowing the mixture to cool in moulds. It is then put in the sewage channel and so mixed with the incoming sewage.

Lime is only used by itself at one of the twenty-seven installations, viz., Maidstone, where it is ground with water and added as milk of lime in the proportion of about 5 grains per gallon. The chemicals are usually added to the sewage by being stirred into it by the aid of special stirring apparatus, or by adding it to the sewage as it flows into the tanks by dripping water upon it when placed in a box which has a false bottom.

Until the issue of the Fifth Report of the Royal Commission on Sewage Disposal there was a tendency in some quarters to discredit the value of chemical precipitation. But in it the Commissioners say their experience in no way justifies this view." Whilst not able to lay down any precise rules as to the particular cases in which it should be adopted, they go on to remark:—"In the case of some sewages, which contain trade wastes, it is almost essential to subject the sewage to some form of chemical treatment before attempting to oxidise the organic matter contained in it, and, in the case of domestic sewage, chemical precipitation materially aids the deposition of the suspended solids and facilitates subsequent filtration."

Septic-Tank Treatment.

The "digestion," or liquefaction of the crude sewage, by the employment of bacteria in septic tanks, was carried out at eight of the works under observation. Some of the tanks at these installations are covered with concrete arches over which a layer of soil is spread; others are open. Two main classes of micro-organisms are employed in the tanks: in the open ones, aerobic bacteria; anaerobes, those which thrive in the absence of air, in the closed ones. Experience, however, has demonstrated that, as regards digestion of the organic solids and the quality of the tank liquid, or effluent, one class of tank possesses no advantage over the other. The closed tank is preferable where it is desired to avoid nuisance from smell.

Septic tanks are constructed of similar material—brick and cement concrete or cement concrete only—to those used for chemical precipitation, and are also usually rectangular in shape. At Accrington, where there are six septic tanks, each of their dimensions are 101 ft. by 67 ft. 6 in., and 9 ft. in depth, with a capacity of 38,000 gallons. At Andover the two tanks are each 80 ft. by 16 ft. 8 in., and 8 ft. 6 in. in depth, with a capacity of 60,400 gallons. At Caterham Barracks the single tank is, roughly, 22 ft. by 12 ft., and 9 ft. 6 in. in depth, and having a capacity of, approximately, 14,000 gallons. At another small installation—Hartley Witney—the two tanks are 70 ft. by 10 ft., and 7 ft. deep, with a capacity of 33,000 gallons.

Where more than one septic tank is employed, it is most usual to use them in parallel. At Accrington, for instance, where six tanks were at work during the observations, they were used in two series of three each. "Originally," says the appendix, "they were worked as one series of six, but it was found that a better tank liquor—more particularly as regards suspended matter—was obtained by using the tanks in two series of three, the reason for this being that the rate of flow through any one tank was thus reduced by one-half."

In some septic-tank installations there is no process of alternately filling and emptying as in the chemical precipitation tank, the sewage being permitted to flow through continuously; but, owing to the slowness of the motion of the sewage in the tank, the contents may be said to be, to a large extent, at rest to allow for the settlement of the solids and for the activity of the various liquefying bacteria. As an illustration of this, assuming the flow through the tanks to be a continuous one, a dry-weather flow of 150,000 gallons per twenty-four hours would give a flow through at the mean water level of once in 19·3 hours at the rate of ·83 in. per minute. At the maximum flow of 220,000 gallons in the same period, the flow through would be once in 13·1 hours at the rate of 1·22 in. per minute.

On the other hand, it seems, however, that sewage should not remain less than twelve nor more than twenty-four hours in a septic tank.

Coming to the practical value of septic-tank treatment as a means of solving the sludge difficulty, in destroying any pathogenic (disease-producing) organisms, and rendering the sewage more easily oxidisable than that chemically precipitated, it has been clearly demonstrated, as the result of these observations, that all the organic solids are by no means deposited; that on leaving the septic tank the sewage is, bacteriologically, almost as impure as on entry, and that it is not more easily oxidised than any other liquid.

Sludging the Tanks.

Sludge forms at the bottom of the tanks in the preliminary process, whether carried out by chemical precipitation or by septic methods, and has to be removed therefrom at varying periods, from a week or month to much longer intervals. Various means are employed in sludging. At the small installation at Withnell, for instance, it is done by opening the sludge-valve in the sedimentation tank and sweeping the liquid sludge towards it. The sludge is then delivered to one of the sludge lagoons, situate at the side of the tanks. These are constructed of house and furnace ashes and drained by agricultural pipes leading to an earthenware open-joint drain. Here the sludge is delivered to drain naturally, and the liquid draining from it passes through the above-mentioned agricultural pipes into an adjacent brook.

This process, as will be seen, is by no means a desirable one, and is most unsatisfactory if carried out in the vicinity of houses, because the sludge takes some months to dry before it can be removed, either to be dug into adjacent land or disposed of to agriculturists for manure.

A far more satisfactory method is that employed at York, where about 140 tons of wet sludge are produced per day. Lime is added to it (4 grains per gallon), and the sludge is then pressed into cakes by the use of sludge presses. These filter-presses are usually worked by a steam-pump or air-compressor, according to the size of press required to deal with the sludge. The press is fitted with vertical cast-iron plates which serve to support cloths of canvas, felt, or hemp, which act as the filtering media. The sludge is forced between these plates, which are tightened up and held together by powerful rods and nuts, or by hydraulic pressure. The filter cloths, as will be seen, allow the liquid squeezed out to pass away into a receptacle underneath, but hold the solids, after which the plates are loosened and the sewage cakes thus formed, and from which a good deal of the moisture has been squeezed, drop into a truck or other receptacle placed underneath, and are ready for carting away. The liquid pressed out is pumped back into the precipitation or septic tank for re-treatment.

The disposal of the sludge cakes, whether resulting from chemical precipitation or septic-tank treatment, is, however, a matter of much difficulty. Local agriculturists are not so keen as formerly in using these cakes for manurial purposes.

Treatment of Tank Effluent.

The effluent from the settling sedimentation or septic tanks has next to be dealt with, and "contact" beds, or the later-introduced percolating filters, are very commonly used for this purpose, which completes the process of sewage purification, unless the effluent therefrom has to reach a very high standard of purity, when it is sometimes run over land.

Contact Beds.

This method is employed, among other places, at Andover, Halton, and Guildford. These "beds" are sometimes made by excavation, and the banks formed of the material excavated. The bottom is laid with 4-in. drain-pipes in herring-bone formation, falling to one or more outlet valves in the lowest corner of the bed. The sizes of these beds vary very much. Those at Halton, four in number, are each, roughly, 28 ft. by 16 ft., by 4 ft. 3 in. in depth, having a total area of 199 sq. yds., and a total cubic content of 282 cub. yds. At Guildford the tanks or beds are constructed of brick and cement built upon made ground and raised above the level of the surrounding land. There the contact beds are five in number, each having an area of about 400 sq. yds., and a cubic content of about 330 cub. yds., with a 2 ft. 6 in. depth of filtering material.

The kinds of filtering media employed vary very much—coke, clinker, flints, stone, saggars (vitrified stoneware), burnt ballast. The material is used in layers of varying sizes, under 1 in., 1 to 2, and up to 3 in. in diameter. Coke and clinker are probably the most suitable filtering media; the smaller the size of the material, so long as it is not too small, the more intimate is the contact of the liquid with it and the greater the purification effected. The Commissioners say:—"Our knowledge of the action of a contact bed" (on the effluent) "is very incomplete, and little is known as to the manner in which the organic substances of sewage are broken down." Most classes of sewage, even if only a moderately high standard of purity is required, need to be passed on to two or even three successive contact beds.

At Withnell "polarite" beds are used for "contact" purposes. Two of those employed are each 18 ft. by 14 ft., and thre

others, each 12 ft. 3 in. by 6 ft. 8 in., having a depth of material of 3 ft. 6 in., composed, from the top of the bed downwards, of 9 in. of sand, 15 in. of mixed "polarite" and sand, and 15 in. of graded gravel, varying from the size of a marble to pieces of 4 in. to 6 in. in diameter. This method, one of the earliest of the kind, gave great satisfaction during the observations, giving better results as regards the quality of the effluent than the other contact beds at Withnell.

At Hartley Witney soft furnace clinker was used. This, however, disintegrated considerably and caused a loss of capacity in the beds.

Unless the site of the works consists of a dense clay it is desirable for the beds to be constructed of building materials; and it is imperative that the outlet chambers be so constructed.

Contact beds are generally filled and emptied by automatic gear, though experience shows this method is not so satisfactory, because it is likely to get out of order, and, as the condition of the beds is an important factor, human control is certainly preferable. They usually receive two fillings per twenty-four hours; this allows for the effluent being about eight hours in contact and for eight hours' "rest" to the beds for purposes of aeration. In some cases, however, two hours' contact and four hours' "rest" have given good results. The effluent remains therein subject to the action of the oxidising organisms—bacteria, worms, larvæ, insects, etc, though what is the respective amount of work performed by each is at present a matter of conjecture.

Percolating Filters.

This is the most recently introduced method for treating all kinds of sedimentation-tank liquid—quiescent, chemical, or septic. As the name implies, the effluent is delivered on to the surface of the bed. This is done either by tipping-troughs, into which the liquid accumulates, or from fixed or revolving distributors or sprinklers, which should distribute it uniformly over the whole area. It is allowed to percolate through the interstices and then to pass away through a similar channel to a contact bed. The filtering material employed is the same as in contact beds. These filters are either rectangular or circular in shape; the latter where revolving distributors are employed.

At Caterham Barracks, for instance, where four filters are used, the size of each is 11 ft. by 9 ft. 6 in., with 5 ft. depth of material. Here the liquid from the tanks is distributed over the filters by the tipping of four troughs, each of which discharges about fifteen gallons of effluent into perforated pipes which extend over the surface of the bed and permit the liquid to trickle through the holes on to it.

As examples of circular filters, those at Accrington, of which there are fourteen, are mostly 62 ft. in diameter and 7 to 9 ft. deep. The material employed is chiefly coke, ranging from 2 to 4 in. in diameter, and is built up on a false bottom, consisting of large semicircular pipes, which rest on a concrete floor. The effluent from a sprinkler-fed filter is, as a rule, better and more highly nitrated than that from a filter bed, which is fed by a stationary distributor.

Percolating filters are constructed very similarly to contact beds, save that they are usually deeper, but better results are obtainable, generally speaking, where the depth of material does not exceed 7 ft.

Comparing properly constructed and worked contact beds and trickling filters, it would seem that the organic matters in the sewage can be oxidised by either type. The filters will, however, usually treat nearly twice the quantity of tank effluent; they are better adapted to variations of flow, and the effluents are better aerated. As regards the cost of the two methods, treatment in filters may be said to cost about two-thirds that of double contact.

Details of Observations.

The details given in connexion with each of the twenty-seven installations are very full indeed, and most interesting and useful to sewage engineers, as well as to chemists and bacteriologists. A brief description of the situation of the works is followed by the method of treatment; population draining to works during observations; water supply in gallons per head, its nature, and whence obtained; number of w.c.'s; sewage system; average daily dry-weather flow: gallons of sewage per head per twenty-four hours, and its character; amount of storm water; capacity of tanks; area and age of contact beds or filters and nature of filtering media; gallons of tank effluent treated; where first effluent is discharged, etc.

Analyses formed a very important part of the work; and these were taken at frequent intervals, hourly in many instances. These aimed at ascertaining the total nitrogen, albuminoid, and total ammonical nitrogen, the "oxygen absorbed," dissolved oxygen, incubator tests, solids in suspension, etc.

In connexion with this work it is interesting to note that a good deal of the bacteriological analyses and the chemical work were carried out by Miss Hartley, Miss Chick, D.Sc., and Miss Power; and that the determination of absorption of dissolved oxygen was made in some cases by the copper chloride method of Miss Homfray and Sir William Ramsay.

Results of Observations.

The results of the eleven years' labours of the members of the Royal Commission on Sewage Disposal have in some respects been somewhat disappointing. They may be summed up by saying that local conditions should primarily decide the selection of a method for the treatment of the local sewage; and following that, either land treatment or artificial filtration, if carried out in accordance with the best-known methods, modified by experience gained in treating the particular sewage, will produce satisfactory results. Many mysteries which surround the subject still invite solution, and this fact is clearly demonstrated by the memoranda contained in Appendix III., which has formed the subject-matter of this article.

NOTES FROM FRANCE.

MEASURES are being taken to facilitate locomotion at the most crowded parts of the streets in Paris. Among the works projected, with this object, by the Municipal administration, is the formation of subterranean passages for foot-passengers at the following points:—The entry to the Avenue du Bois de Boulogne, Avenue Marigny (opposite the Grand Palais), Place de l'Opéra, Boulevard des Italiens, Boulevard Montmartre, Boulevard St. Denis, Place de la République, Boulevard Magenta, Rue Lafayette, Boulevard Hausmann, Chaussée d'Antin, Place du Havre, and Rue de Rivoli.

At Perigueux a fine mosaic of the Vth century has been discovered, in a good state of preservation. It covers a surface of about 70 square mètres, and presents a curious entanglement of geometric designs in five colours, surrounded by a decorative border of a design differing from anything previously found in mosaics of this period.

The excavations which are being carried on, under the direction of M. Tournaire, for the enlargement of the Palais de Justice at Paris, have led to some interesting discoveries of foundation walls of the XIIth and XIIIth centuries, on which have been found the seals or symbols of the mediæval "corporations du Bâtiment."

There is now being completed, at the Sèvres manufactory, a monument to the joint memory of Danton and Gambetta, to be erected at Sèvres. Both the sculptures, which are by M. Alfred Boucher, and the architectural portion of the monument, will be carried out in Sèvres stone-ware ("grès ceramique"), the colour combination of which has been worked out by two chemists of the Sèvres manufactory. The monument will include the statues of the two Tribunes, and bas-reliefs representing respectively the soldiers of the First Republic and those of 1870.

The Fine Arts Department of the Government has presented the Municipality of Paris with four fine statues—"Winter," by M. Dubois; "Summer," by M. Sicard; "Day," by M. Paul Gasq; and "Night," by M. Hector Lemaire. These works are intended to decorate the lawns at the margin of the central *rond-point* in the Champs-Elysées.

Legal Column.

HOUSING AND BY-LAWS.

LAST week we referred to the undesirable results attending the adoption by the local authorities of building by-laws unsuitable to the character of the districts, and it is therefore satisfactory to see that this question was raised in the debate on the Town Planning Bill on Friday last. Lord Robert Cecil moved a new clause to the effect that if the Local Government Board were satisfied that the erection of working-class dwellings was unreasonably impeded by building by-laws, the Board should have power to call upon the local authority to amend the by-laws, and, failing compliance, the Board should substitute other by-laws. Mr. Burns expressed sympathy with the purpose of the clause, and he also spoke of the service rendered by the Press in drawing attention to this question, which had contributed to making the local authorities more reasonable in the preparation of by-laws, and he undertook to see whether some special procedure could not be adopted enabling the Board to deal with specially recalcitrant bodies.

Mr. Burns said that he had done his best to make the local authorities recognise that past conditions required reviewing, and we think he was justified in taking some credit to himself for the reasonable attitude he has assumed in this matter. His fear that an ill-devised relaxation of the building by-laws for special purposes might result in the building by-laws being evaded without justification by other persons is certainly a ground for exercising caution. The House of Commons accepted his assurance, and it will be interesting to see the form it will take when the Bill reaches the House of Lords.

Mr. Burns expressed the hope that an amendment of the Public Health Acts and Building By-laws in respect to other points might be possible next year.

DISCOVERIES AT OLD SARUM.—One of the first results of the excavation of Old Sarum, which has been commenced recently, has been to open out the original entrance to the castle, which occupied the inner and higher of the two rings constituting the earthwork. The gateway appears to have been flanked by projecting bastions, which unfortunately have been stripped of their facing stones. On each side of the gate passage, which was 11 ft. 6 in. wide, was a guard chamber. That on the south side has been opened out. It had a fireplace on the side opposite the door, and retains parts of its barrelled vault. To preserve this, the vault has been built up with rough masonry. Both the side walls and the western or inner face of the gatehouse retain the lower courses of the ashlar facings. On the west side of the castle area a great length of the concrete revetment of the original chalk embankment has been laid open, one section being faced for a considerable height with the ashlar. Parallel with this another wall has been disclosed. This discovery is being followed up, and will doubtless lead to interesting results. It is known that one of the towers on the enclosing wall contained a postern and a bridge to the outer bailey, and one of the latest discoveries seems to be connected with this.

THE BUILDER

SEPTEMBER 18, 1909.

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All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

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MEETINGS.

MONDAY, SEPTEMBER 20.

Royal Sanitary Institute (Lectures for Sanitary Officers).—Dr. Charles Porter on "Sanitary Law"—I. 7 p.m.

WEDNESDAY, SEPTEMBER 22.

Royal Sanitary Institute (Lectures for Sanitary Officers).—Dr. Charles Porter on "Sanitary Law"—II. 7 p.m.

FRIDAY, SEPTEMBER 24.

Royal Sanitary Institute (Lectures for Sanitary Officers).—Dr. Charles Porter on "Sanitary Law"—III. 7 p.m.

SATURDAY, SEPTEMBER 25.

Junior Institution of Engineers.—Visit to Imperial International Exhibition, Shepherd's Bush. 3 p.m.

Incorporated Association of Municipal and County Engineers.—Eastern District Meeting to be held at Lincoln.

Fifty Years Ago.

FROM THE *Builder* OF SEPTEMBER 17, 1859.

CONDITION OF LONDON.

AT the entrances of the narrow courts, existing in too many places, you may detect that peculiar fever scent which positively speaks of sickness and death.

The cow-yards and stables make themselves known afar. In these places men are busily washing with floods of water; but pits of refuse remain which render this process of little avail. On such days, the miasma from undrained places is intolerable. Now is the time to test the ventilation of hospitals and schools, and when the greatest attention to cleanliness should be paid by all. Any neglect of this is, in such a condition of the atmosphere, clearly perceptible. On the evening of the day named, we had occasion to call at some of the houses in the back streets east of Judd-street, in the New-road, and at others in Chapel-place, Brompton. To a stranger, they were unbearable. It is dismal to see the crowds of pale-faced, dwarfed, and rickety children in such places. Women, miserable-looking, wander about the first-named neighbourhood, seemingly without object, and those who have good opportunities of judging say that drunkenness amongst the women in such districts is too common, to which often their circumstances have led. The excesses of the lower classes of our population are deeply to be deplored, preached against, and checked; but before judging too harshly, condemners should visit some of the homes, and remember that grapes are not gathered from thistles.

*** Happily much progress has been made, since this was written, in doing away with unhealthy areas such as that referred to; but much remains to be done. How long is it to be before the slum streets around the Seven Dials neighbourhood, for instance, are cleared out and rebuilt in a healthy manner?—ED.

Illustrations.

LAVENHAM CHURCH TOWER.

THE tower was commenced in 1486, but the work was interrupted about 1500 and not completed till 1525.

It was built by John de Vere, thirteenth Earl of Oxford, and Mr. Spring, a rich clothier of Lavenham, who built the well-known Lavenham Guild Hall. Mr. Spring was granted a coat-of-arms by Henry VIII., and these are freely used in the upper portion of the tower.

The lower stories nf the tower show much the best workmanship; below the ringers' loft the flints are coursed and of even size; above they are very irregular, and the scaffold holes have never been filled up.

The architect is unknown; he is said to have been killed on the work, and this possibly explains why the tower was never finished. It is 141 ft. high, equal in height to the length of the nave and chancel.

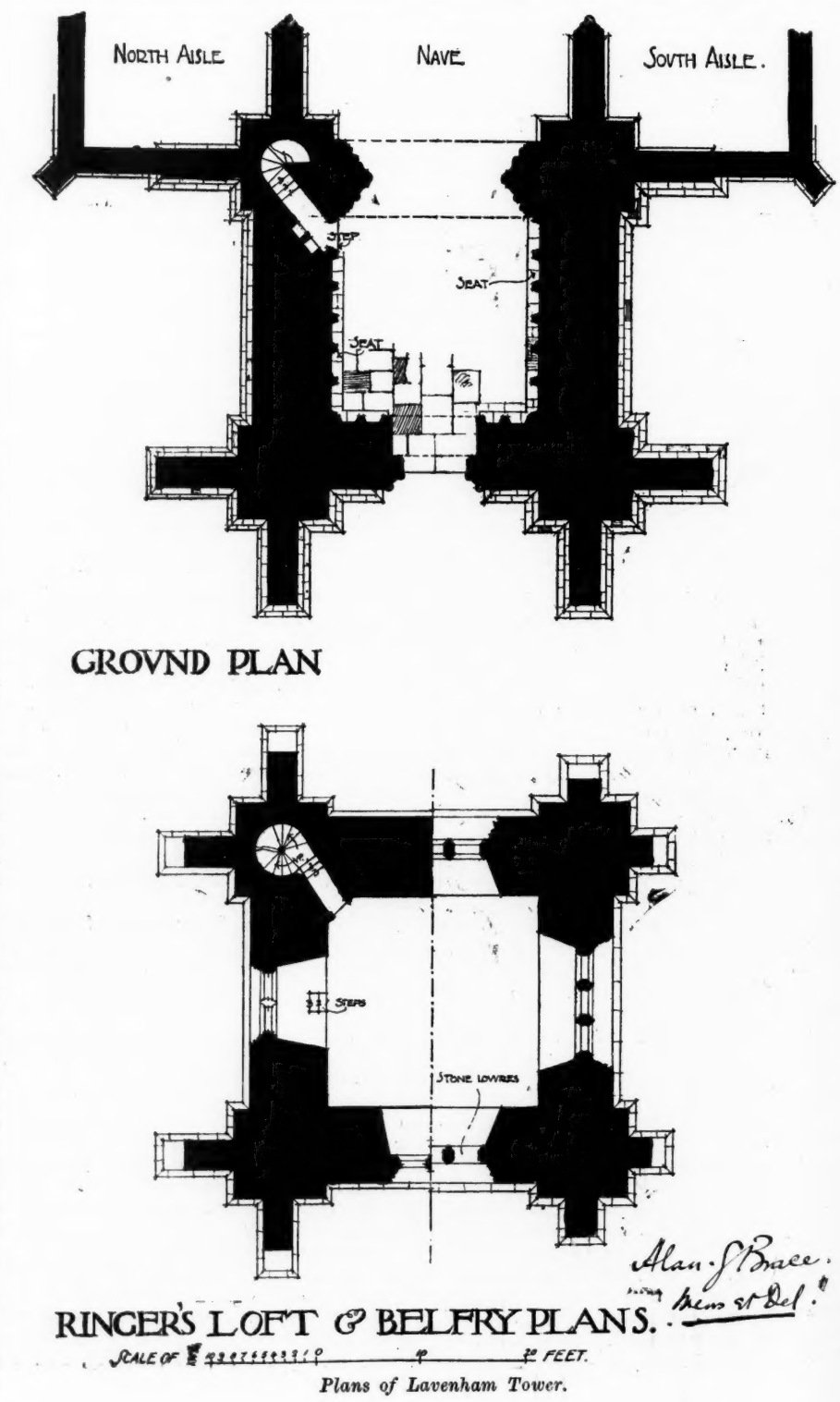
The tower contains a fine peal of eight bells.

ALAN G. BRACE.

BERKSHIRE COUNTY COUNCIL OFFICES, READING.

WE give the elevations and plans of the first premiated design, by Messrs. Warwick & Hall, for the new Berkshire County Council Offices proposed to be erected at Reading.

Premiums of 100*l.*, 75*l.*, and 50*l.* were offered by the County Authority for the three best designs submitted. Mr. Mervyn Macartney acted as Assessor.



Plans of Lavenham Tower.

The authors of this design have given particular attention to the planning of the committee rooms so that members of the Council using these rooms can have direct communication from the hall of the Assize Courts without passing through any considerable portion of the new building.

The Education Committee room has been placed in the centre of the department on the first floor adjoining the main staircase and lift, and is arranged so that it can be easily divided into two rooms, each with their separate fireplace and doorway.

The main staircase (with passenger lift) is planned so that it will be equally convenient of access from the main entrance of the new building and from the Assize Courts; and is so placed that it serves each department centrally on the upper floors.

The ground floor provides accommodation for the Clerk of the Peace and his department, as required in the conditions; the Education Department being placed on the first floor. The second floor is devoted to the County Treasurer's department, Land Steward and Medical Officer, and the third floor is utilised for the Surveyor's department, and the back portion for a small caretaker's flat.

The lavatories are all placed on an internal area, so as to simplify the drainage system. They are also in a convenient position for use either from the new building or the hall of the Assize Courts.

The aim in designing the elevations has been to treat them in a broad, simple manner, relying upon the general proportions for effect rather than the use of elaboration of ornament. The elevations throughout will be in red brick (five courses to the foot) with Portland stone dressings, and the roof will be covered with pantiles.

PROPOSED CHURCH AT BATTS CORNER, FRENSHAM.

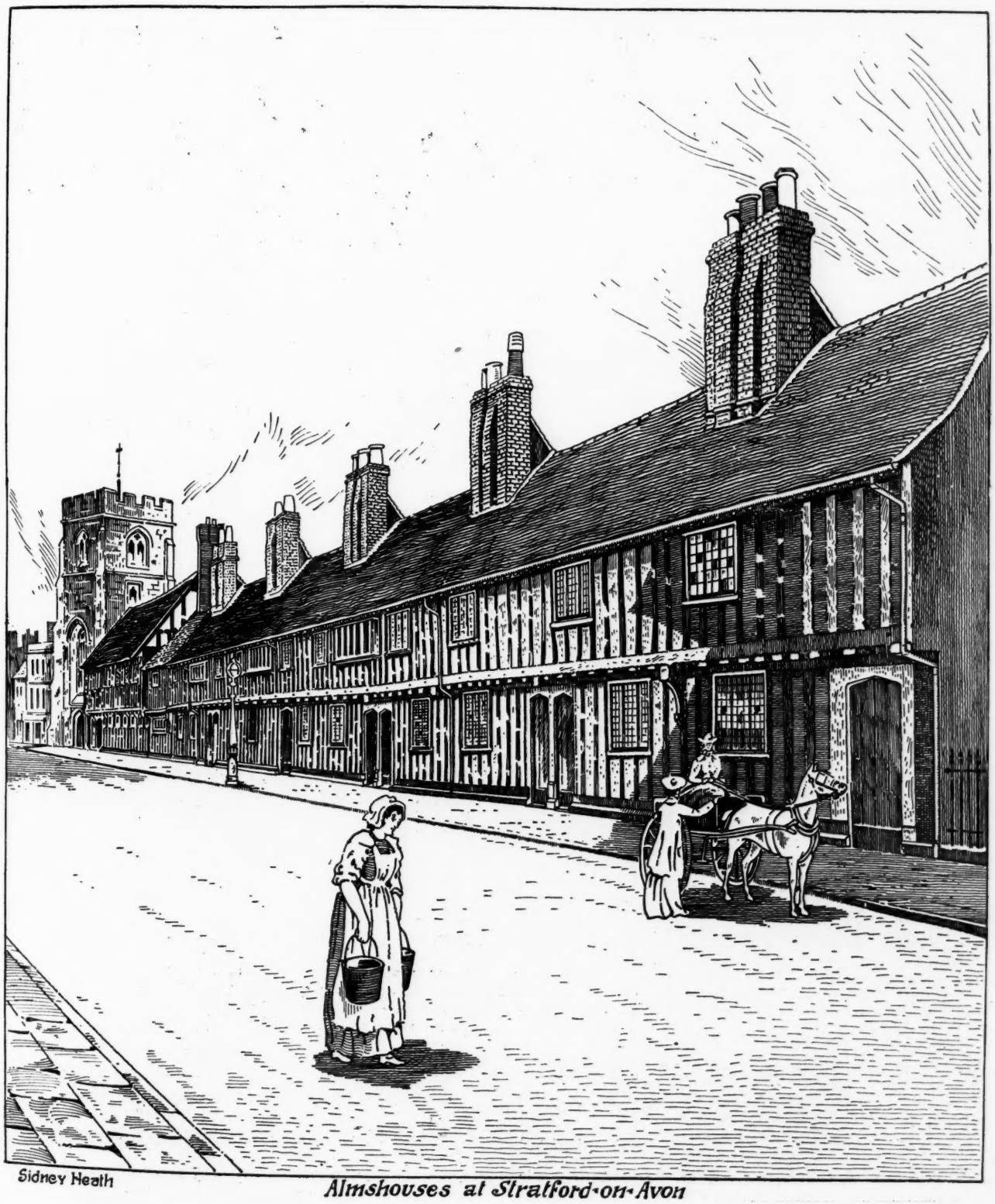
It is proposed that this church should be built of Bargate stone lined with brick. The roof-trusses, purlins, and wind braces will be of oak, the rafters ceiled with plaster. The roof will be boarded, felted, battened and cross-battened, and covered with hand-made, sand-faced pantiles.

The church is intended as a chapel of ease for Frensham Parish Church. The first instalment to be built is planned to seat 120 persons.

The design is by Mr. W. Curtis Green.

ALMSHOUSES AT STRATFORD-ON-AVON.

In addition to the beautiful church of Holy Trinity and the birthplace of Shakespeare, Stratford-on-Avon has, in the long range of buildings formed by the Guild Chapel, Grammar School, and Almshouses, one of the most interesting street views in the country. It is very rare, except on the Continent, to find three adjoining buildings of this kind not only standing intact, but still fulfilling the objects and purposes for which they were founded, and this without a break since their first institution. The Almshouses and Grammar School were founded by Edward VI., and the former provides for twelve poor men and women. Until a few years ago the fronts of these almshouses were nearly all covered with



Sidney Heath

Almshouses at Stratford-on-Avon

stucco; but this has now been removed and the whole of the massive oak timbers of the framing exposed to view.

In 1901 a curious custom attaching to the foundation was revived on the discovery of an old document known as "Sir Hugh Clopton's Settlement in his name and family," which had been deposited in the museum attached to Shakespeare's birthplace. Sir Arthur Hodgson, the owner of the Clopton estates, on becoming acquainted with the nature of the deed, resolved that the terms of the bequest should be carried out, thus reviving a quaint ceremony of old Stratford that had fallen into desuetude for more than a century. The bequest bears the date December 12, 1732, and stipulates for the preaching of a sermon in the ancient chapel of the Guild of the Holy Cross on May 29 in each year, "annually commemorating the happiness of the glorious restoration of our Constitution in Church and State," for which the sum of one guinea was to be paid the vicar of the parish, five shillings the clerk, and one shilling each given to the twenty-four almsfolk. The bequest further provides for the purchase of blue coats for the men, and blue gowns for the women every second year, "to be accounted from the feast of the Annunciation of the Blessed Virgin Mary which shall happen next after the decease of the said Hugh Clopton," and upon the coats and gowns the cross of the arms of the Clopton family was to be affixed. Any residue was to be spent in straw hats and aprons for the almswomen, or in such other manner "as the Mayor, Aldermen, and Burgesses shall think fit."

SIDNEY HEATH.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE Building Act Committee of the London County Council met on July 26 to deal with applications made under this Act. The proceedings were governed by the clause in the order of reference which empowers the Committee at certain seasons to act on behalf of the Council in relation to matters included in the Committee's order of reference.

Lines of Frontage and Projections.

Brixton.—Reconstruction of a urinal at the White Horse public-house, Brixton-road, abutting upon Loughborough-road (Mr. H. C. J. Edwards for the Lambeth Metropolitan Borough Council).—Consent.

Fulham.—Erection of a building to be used as a mission church on the eastern side of Musgrave-crescent, Walham-green, abutting also upon the southern side of Kempson-road (Mr. C. G. F. Rees for Baron Bruno von Schröder).—Consent.

Greenwich.—Erection of six houses on the eastern side of Beaconsfield-road, Westcombe-park, Greenwich (Messrs. Baldwin & Co.).—Consent.

Hackney, Central.—The erection of a building on the eastern side of Clifton-grove, Graham-road, Hackney, northward of No. 5 (Mr. C. G. F. Rees for the Committee of the German Hospital).—Consent.

Holborn.—Retention of wooden louvre external shutters to the windows on the front of Evelyn's-buildings, Dorrington-street, Holborn (Mr. E. C. Frere for the Vicar of St. Alban's, Holborn).—Consent.

Kensington, North.—Deviation from the plans approved for the erection of porches and bay windows to houses on both sides of Finstock-road, the eastern side of Wallingford-avenue, and the northern side of Oxford-gardens, Kensington, so far as relates to a modification in the design of the porches (Messrs. Trant, Brown, & Humphreys).—Consent.

Kensington, North.—Erection of bay windows and a porch to a house on the eastern side of The Triangle, Highlever-road, St. Quintin's-park (Mr. J. P. Williams).—Consent.

Kensington, South.—Erection of an addition at the rear of No. 19, Cottesmore-gardens, to abut upon Stanford-road (Mr. H. Row for Dr. S. Taylor).—Consent.

Lewisham. — Retention of trellis work enclosures to the porch at No. 125, Manor-park, Lewisham (Mr. W. J. Asburey).—Consent.

Marylebone, East.—Erection of two store buildings at the Zoological Gardens, on the southern side of the Outer Circle, Regent's-park (Messrs. Hudson & Hunt for the Zoological Society of London).—Consent.

Marylebone, East.—The retention of a projecting sign at No. 49, Wigmore-street, St. Marylebone (Messrs. W. Garstin & Sons).—Consent.

Marylebone, East.—The casing, in stone, of the front walls of the Portland Hotel, Great Portland-street, St. Marylebone, and the erection of a porch (Mr. G. Vernon).—Consent.

St. George, Hanover-square.—Erection of an external iron staircase next to Brook's-mews at Claridge's Hotel, Brook-street, St. George, Hanover-square (G. Trollope & Sons and Colls & Sons, Ltd.).—Consent.

Strand.—Deviation from the plans approved for the erection of an iron and glass shelter at Blanchard's Hotel, Beak-street, Regent-street, W., so far as relates to a modification in the details of the construction (Messrs. J. Wilkins & Co. for Messrs. Blanchard).—Consent.

Wandsworth.—Erection of a one-story shop in front of No. 182, Trinity-road, Wandsworth Common (Mr. H. Bignold for Messrs. J. Down & Son).—Consent.

Woolwich.—The erection of buildings on the southern side of Plumstead High-street, westward of No. 240 (Mr. J. Rush Dixon for the Woolwich Metropolitan Borough Council).—Consent.

Wandsworth.—That the Council do not consent to the erection of one-story shops in front of Nos. 648 and 650, Streatham High-road, Wandsworth (Messrs. H. M. & W. Grellier for Mr. G. Seth Mines).—Refused.

Width of Way.

Hackney, Central.—The erection of buildings, to be known as Nos. 3 to 14, on the east side of Fox's-lane, Homerton, with the buildings and forecourt fences at less than the prescribed distance from the centre of the roadway (Messrs. M. H. Judge & Sons for Mr. F. C. Clarke).—Consent.

Hampstead.—Retention of an addition at the Tower Royal Works, at less than the prescribed distance from the centre of the footway leading from West End-lane to Finchley-road, Hampstead (Mr. C. G. Stanham for Mr. P. Sloper).—Consent.

Width of Way and Line of Frontage.

Islington, West.—Erection of buildings on the eastern side of York-road, Islington, to abut also upon the southern side of Pleasant-grove (Mr. H. Goodchild for the Combined Estates Company, Ltd.).—Consent.

Width of Way, Frontage, and Construction.

Hoxton.—The erection of an iron and glass covered gangway to extend across Whitfield-street, Shoreditch, and connect Nos. 6 to 9, Whitfield-street with Nos. 52 to 54, Leonard-street (Mr. R. W. Hobden for Messrs. Blades, East, & Blades).—Consent.

Lines of Frontage and Construction.

Norwood.—The erection of an iron building of a temporary character on the western side of Tulse-hill, Norwood (Mr. A. J. Archer for the Brixton Skating Rink, Ltd.).—Consent.

Space at Rear.

Chelsea.—A deviation from the plan approved for the erection of a building on the northern side of King's-road, Chelsea, westward of Upper Manor-street, with an irregular open space at the rear, so far as relates to a modification in the position of the boundary of the site and of the proposed external water-closet at the ground floor level (Mr. R. Blomfield).—Consent.

St. George, Hanover-square.—A modification of the provisions of sect. 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a building on the site of No. 19, Berkeley-street, Piccadilly (Messrs. Richardson & Gill for Messrs. Hammersley, Kennedy, & Co.).—Consent.

Westminster.—A modification of the provisions of sect. 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a building at the north-eastern corner of Smith-square, Westminster, with an irregular open space at the rear (Messrs. Blow & Billery for Lady Agnew).—Consent.

Whitechapel.—That the Council do not allow a modification of the provisions of sect. 41 with regard to open spaces about buildings, so far as relates to the proposed erection of an addition at the rear of No. 73, Whitechapel-road, Whitechapel (Mr. J. R. Moore-Smith).—Refused.

Deviation from Certified Plans.

Strand.—That the Council do not sanction certain deviations from the plans certified by the District Surveyor, so far as relates to the proposed rebuilding of No. 15, Rupert-street and Nos. 3 and 4, Rupert-court, Westminster (Mr. J. W. Stevens for Mr. C. Pinoli.—Refused.

Deviation from Certified Plans and Projections.

Chelsea.—Deviations from the plan certified by the District Surveyor, so far as relates to the proposed erection of a building on the north-eastern side of Draycott-avenue, Chelsea, to abut also upon the south-eastern side of Walton-street (Messrs. Joseph & Smithem for Mr. H. E. Beddington).—Consent.

Alteration of Buildings.

Holborn.—A modification of the provisions of sect. 41, so far as relates to the proposed erection of additions at the third floor level at the rear of Nos. 8 and 9, Hart-street, Holborn (Mr. C. Fitzroy Doll for Messrs. Olver & Co.).—Consent.

Alteration of Building and Space at Rear.

Kensington, South.—The retention of a conservatory on the roof of the rear portion of No. 9, Gloucester-road, Kensington (Messrs. Chesterton & Sons for Mr. S. W. Gatt).—Consent.

Conversion of Buildings.

Strand.—That the Council do consent to the use of the first, second, and third floors of No. 46, Dean-street, Soho, for dwelling-house purposes (Mr. W. A. Collins).—Consent.

Cubical Extent.

City of London.—That no objection be raised in connexion with buildings at Broken Wharf, Upper Thames-street, to the proposal to make openings in the party walls between the buildings (Messrs. W. Dunn & R. Watson).—Consent.

Norwood. — Deviations from the plans approved for the conversion into a motor garage of stable premises approached out of the eastern side of Knight's Hill-road, Norwood, so far as relates to an office constructed in the garage, the bricking up of openings in the wall on the northern side of the machine shop, and the position of the fire appliances (London General Omnibus Company, Ltd.).—Consent.

St. George, Hanover-square.—That the Council, on the application of Mr. F. T. Verity, do consent to a deviation from the plans approved for the erection at the premises of Lewis & Allenby, Ltd., abutting upon Regent-street, Conduit-street, and New Burlington-place, St. George, Hanover-square, of a division next to Regent-street, to exceed in extent 250,000 cubic ft., so far as relates to the omission of the fire-resisting door from the half-landing between the basement and ground floor of the staircase.—Consent.

St. George, Hanover-square.—That the Council, on the application of Mr. F. T. Verity, do not consent to a deviation from the plans approved for the erection at the premises of Lewis & Allenby, Ltd., abutting upon Regent-street, Conduit-street, and New Burlington-place, St. George, Hanover-square, of a division next to Regent-street, to exceed in extent 250,000 cubic ft., so far as relates to the substitution of teak doors for the double iron doors in the openings in the division wall on the second, third, and fourth floors of the Conduit-street block of the premises.—Refused.

Bermondsey.—That the consent of the Council be not given to the erection of an addition at Messrs. J. Garner & Sons' premises, used only for the purposes of the trade of leather-dressing and finishing, on the northern side of Grange-yard, Bermondsey, whereby a division of the building will exceed in extent 250,000 cubic ft. (Messrs. G. Elkington & Son).—Refused.

Uniting of Buildings.

City of London.—The further uniting of Nos. 111 and 113, Queen Victoria-street, City, at the first and second floor levels, without requiring the floors of the buildings to be made fire-resisting (Messrs. Hudson & Booth).—Consent.

City of London.—The uniting of Nos. 6 and 8, Bow-lane, City, at the first, second, and third floor levels (Messrs. C. P. Whiteley & Son for Mrs. Nicholas).—Consent.

City of London.—The uniting of Nos. 44 and 45, Farringdon-street, City, by openings at the second, third, and fourth floor levels with the buildings extending above the diagonal line drawn in accordance with the provisions of sect. 41 (Mr. W. E. Clifton for the Holborn Viaduct Land Company, Ltd.).—Consent.

City of London.—The uniting of No. 9, Bow-lane, City, with No. 72, Watling-street, by an opening at the ground floor level (Messrs. E. & F. Parsons for Messrs. Mansi Brothers).—Consent.

City of London.—The uniting of Nos. 34 and 35, Cock-lane, Snow-hill, City, by additional openings in the party walls on the ground, second, and fourth floors, and also the erection of water-closets at the third floor level of No. 34 and the first floor level of No. 35, respectively, without requiring the walls below such water-closets to be thickened (Mr. G. Jones).—Consent.

City of London.—The uniting of No. 75B with No. 77, Queen Victoria-street, City (Mr. R. E. Crossland for the Empire Typewriter Company, Ltd.).—Consent.

Finsbury, East.—A modification of the plans approved for the formation of openings in the party wall between Nos. 17 and 18 and Nos.

19 and 20, West Smithfield, so far as relates to the omission of one of such openings on each of the first, second, and third floors of the building, and to a reduction in the size of another opening on each of such floors of the building (Mr. G. Vickery).—Consent.

Islington, South.—The use of armoured doors in lieu of iron doors to openings at Nos. 24 to 30 (even numbers only) inclusive, Graham-street, Islington (Mather & Platt, Ltd., for Mr. A. F. Vigers).—Consent.

Kensington, South.—The conversion of Nos. 34 and 34A, Emperor's-gate, Kensington, into residential flats (Mr. H. Row).—Consent.

St. George, Hanover-square.—That the application of Messrs. Withers & Meredith, for an extension of the period within which the uniting of Nos. 17 to 21, Dering-street, St. George, Hanover-square, with Nos. 315 to 317, Oxford-street, by openings on the first and second floors was required to be commenced, be granted.—Consent.

Strand.—The formation of an opening at the basement level between No. 90, Wardour-street, Strand, and the adjoining building southwards, and the retention of an opening at the basement level between two divisions of No. 90, Wardour-street (Mr. H. A. Woodington for Mr. C. Clarke).—Consent.

Finsbury, East.—That the Council do not consent to the uniting of Nos. 83 and 85, Golden-lane, Finsbury, by the formation of an opening at the second floor level (Mr. R. Butler for Messrs. H. T. Greenlaw & Co.).—Refused.

St. Pancras, East.—That the Council do not consent to the formation of openings in a party wall between buildings on the north-eastern side of Whitcher-mews, Rochester-road, St Pancras (Mr. C. H. Peppiatt).—Refused.

Building for the Supply of Electricity.

Chelsea.—That the Council, on the application of Mr. A. Roberts, on behalf of the Chelsea Electricity Supply Company, Ltd., do permit the retention at the generating-station, Manor-street, Chelsea, of the four windows in the western wall of the engine-room, overlooking the boiler-room roof, such windows being glazed with fire-resisting glazing and the opening parts fixed, in lieu of such windows being bricked.—Consent.

Architectural Societies.

NORTHERN ARCHITECTURAL ASSOCIATION.

On Saturday last the members of the Northern Architectural Association paid a visit to Corbridge-on-Tyne, and proceeded to inspect the remains of the Roman town of Corstopitum, under the guidance of Mr. R. H. Forster, who is in charge of the work of excavation, and who kindly explained the various items of interest.

The site of the excavations is situate about half-a-mile westward of the village of Corbridge, and the land has been under cultivation for many centuries.

It was in connexion with the production of the County History of Northumberland dealing with the Corbridge district in particular that the idea of excavating the site of this buried Roman town first claimed attention, and during the last four years sufficient evidence has been produced to give a good general idea of the arrangement and plan of the various buildings, which occupy a space of from 20 to 30 acres.

The buildings adjoining the main road on the north side were explained by Mr. Forster, and considerable interest was manifested in the architectural details of the fountain and the large and important building to the east of the fountain, which seems to have been the forum or market-place. The masonry in this building has been described as the finest example of Roman work in this country.

The recent excavations have disclosed the situation and part of the columns and bases forming a colonnade in front of the two large granaries.

The exploration has been remarkable for the extensive discovery of relics of every description, and a visit to the temporary building which has been fitted up as a museum proved of the greatest interest.

Here are stored pottery and ware in great variety, besides tools, chisels, axes, and domestic articles, many of which are in an excellent state of preservation.

A feature which adds considerably to the interest is the large plan displayed in the museum, where the various buildings are shown plotted to scale with great care, so that a careful record is being kept of the features which have of necessity been covered up.

At the conclusion of the visit a hearty vote of thanks was accorded to Mr. Forster on the motion of the President, Mr. G. J. Brown, of Sunderland.

DEVON AND EXETER ARCHITECTURAL SOCIETY.

On Saturday last week the members of this society made an excursion to Totnes, where various places of interest were visited, among them being the Castle, Guildhall, and Church, under the guidance of Mr. E. Windeatt. The old city wall, council chambers, and North Gate were also inspected. The President, Mr. W. H. May, of Plymouth, afterwards entertained the members to luncheon. In a brief speech, the President alluded to the attractions of Totnes, and thanked Mr. Windeatt for the interesting manner in which he had explained them, and also the Vicar for his courtesy in showing the church. Mr. Harbottle Reed having proposed a vote of thanks to the President for his hospitality, the Vicar, Mr. Windeatt, and Mr. Tollitt replied. After luncheon, further places of interest were visited, as well as several houses with most elaborate plaster ceilings of the XVIth and XVIIth century dates.

THE "BEST" ENLARGING AND REDUCING SCALE.

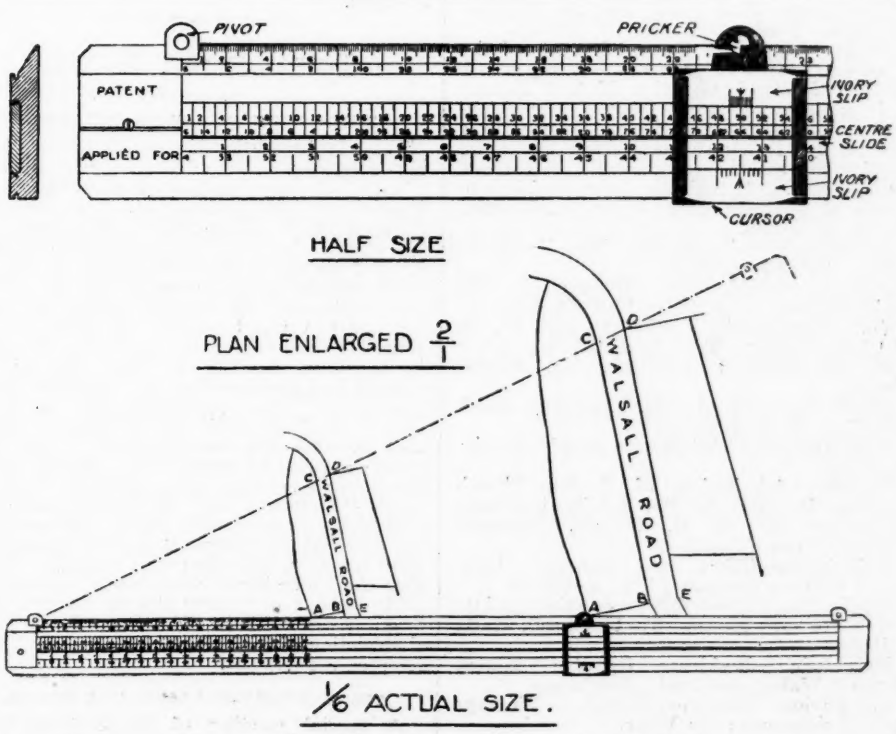
We have received from Mr. W. Mavitta, of Birmingham, an example of his new instrument for the ready enlargement and reduction of plans and drawings of all kinds. The appliance consists of a body, 29 in. long by 1¼ in. wide by 5-16 in. thick, upon the tapered edge of which are engraved two scales of equal graduations, one reading from right to left, and the other from left to right, each scale having 1,080 divisions in all. A small pivot plate is attached at the starting point of each scale, and the plate can be fixed upon the drawing to be reproduced by means of a suitable pin. By the use of these two pivot centres a drawing measuring 54 in. square can be reduced in certain proportions, or a smaller drawing enlarged in certain proportions to the same dimensions.

For the purpose of enlargements and reductions a reversible slide is fitted in the body of the instrument. One face of the slide is graduated with four scales—two for enlarging one-third, and two for reducing one-third, one scale of each pair reading from right to left, and the other from left to right. The other face of the slide is similarly graduated with scales for enlarging ⅔ and ¾, and reducing ½ and ⅓. All scales on the reversible slide are open divided, smaller divisions being read on ivory slips carried by a cursor, for which five ivory slips are provided corresponding to the various proportions of enlargement and reduction indicated by the scales on the slide.

Additional slides are obtainable, so as to make the scale available for any proportionate enlargement or reduction required.

The method of using the instrument is very simple, as may be seen by the following description and the accompanying diagram:—The pivot pin is fixed at any convenient point on the drawing, and the scale placed in position thereon. The scale on the tapered edge of the body is brought in contact with the point A of the drawing to be enlarged, the distance from the pivot is read off, and the same distance on the selected enlarging scale is pricked off by means of spring needle point attached to the cursor. Points B, C, D, E, and others are dealt with in like manner.

The scale is of neat design and excellent workmanship. There is nothing liable to get out of order or adjustment, and the instrument is one we can confidently recommend to our readers as an accurate, simple, and practical device for the purposes mentioned.



Mavitta's Enlarging and Reducing Scale.

LONDON AND DISTRICT BOROUGH COUNCILS.

Battersea.—The carriage-ways of six roads are to be repaired with granite macadam, at an estimated total cost of 3,050*l*. A new side entrance is to be constructed to a sewer in St. John's-hill, at an approximate cost of 85*l*. Plans have been passed as follows:—Mr. J. W. Ash, rebuilding stables at rear of 56, Northcote-road; Bridge Cycle Company, shed to be used as cycle factory and store at rear of 58, Battersea Bridge-road; Messrs. L. Whitehead & Co., skating-rink in Vardens-road.

Bethnal Green.—The premises, 46, Digby-street, have been purchased by the Borough Council for 425*l*. The site is to be used for an extension of the depôt. Clare-street is to be repaved with redressed setts from stock instead of asphalt, as originally proposed.

Brentford.—The Urban District have passed plans for Mr. J. J. Fuller for nine houses in Bollo-lane.

Molesey (*Surrey*).—Messrs. Foster, Lovell, & Lodge, architects for the proposed new isolation hospital, have completed the plans. The Council at their last meeting decided, in regard to certain points on which the architects asked for instructions, that the building be lighted with gas, that a clerk of works be appointed, and that tenders be advertised for in due course.

St. Pancras.—Messrs. Dunk & Bousfield, architects, Billiter Square-buildings, E.C., have been granted permission to construct vaults and pavement lights at from 376 to 384, Euston-road. An application by Mr. John Newcome, 182, Southampton-street, Camberwell, agent for the Amalgamated Society of Railway Servants, to build over a sewer which runs across the site of the proposed new offices of the

Society at 195-7-9, Euston-road, and 39, 40, 41, Gower-place, has been granted upon conditions.

Southwark.—The General Purposes Committee of the Borough Council report that owing to the London County Council (General Powers) Bill having received the Royal assent, they have instructed the Borough Engineer to proceed with the necessary preliminary works in connexion with the construction of subways at the Elephant and Castle headway, and for the preparation of detailed drawings and specifications for the work. An application by the Chief Engineer of the London County Council for permission to erect a ventilating column in Rockingham-street has been granted. The column is to be put up in consequence of the fact that during recent storms the existing manhole in Rockingham-street, which weighs from 2½ cwt. to 3 cwt., had on more than one occasion been blown up owing to the pressure of air in the sewer. The ventilating column will enable the manhole leading to the chamber on the southward and Bermondsey relief sewer to be closed, thereby preventing the egress of water in time of heavy rain. Plans, submitted by Mr. M. W. Matt, architect, Birkbeck Bank-chambers, Holborn, W.C., in regard to a proposed new frontage line in Winchester-street, have been passed by the Works Committee.

Watford.—The site of a reservoir at Bushey has been purchased by the Urban District Council.

PROJECTED NEW BUILDINGS IN THE PROVINCES.

ABERTILLERY.—Twenty houses; Mr. Adams, architect, Abertillery. County school; Mr. E. A. Johnson, architect, Merthyr; Messrs. Thomas & Son, builders, Abergavenny.

Ballingham.—Restoration of parish church; the churchwardens.

Ballyhinch.—Congregational church; Mr. J. Seeds, architect, Donegall-square, Belfast.

Bargoed.—Twenty-eight houses; Mr. I. Leyshon, architect, Hamburg-road, Bargoed.

Barrowfield.—Additions to St. Peter's and St. Paul's Church, for the Trustees.

Barrow-in-Furness.—Extension to cottage homes, Roose-road, for the Guardians.

Bishop Auckland.—Rink, for the Olympia Rink Company, Ltd., Bishop Auckland.

Bishop's Stortford.—Extensions to infirmary, for the Guardians.

Blackpool.—Street of houses; Surveyors, St. John's Estate Company, Blackpool.

Bothwell.—Roman Catholic chapel (8,000*l.*), for the Trustees.

Bournemouth.—Skating-rink; Mr. G. F. Ward, architect, 71, Colmore-row, Birmingham.

Chatham.—The Town Council have approved of a plan lodged by Messrs. J. & P. Burrell for a market in the High-street.

Chesterfield (Derby).—Additions to Workhouse, for the Guardians.

Cobham.—Mortuary, cemetery; Messrs. Mills & Somerville, architects.

Colbren.—Chapel; Mr. W. B. Rees, architect, Dumfries-place, Cardiff.

Darlington.—Banking premises, for the London and Joint Stock Bank; Messrs. Clark & Moscrop, architects, Darlington.

Dennystown.—New works for the Dennystown Brass Works, Dalreach, Dumberton.

Dudley.—The Town Council has passed the following plans:—Storerooms, Priory-street, for the Midland Counties Mutual Benefit Society; storage-battery house, generating-station, Stourbridge-road, for the Corporation; four houses, Halesowen-road, Netherton, Mr. S. Hickton; additions to works, Porter-street, for Messrs. J. & A. Hillman, Ltd.; additions to Plume of Feathers public-house, High-street, Mr. J. H. Fones.

Dunstan.—School (5,000*l.*); Mr. Nordham, builder, Dunstan-on-Tyne.

Durham.—School, Close House; Mr. W. Rushworth, architect, Shire Hall, Durham.

East Howe.—School (4,000*l.*); Mr. W. J. Fletcher, architect, Shire Hall, Dorchester.

Elmsall.—Church; the Rev. A. Gould, Elmsall.

Gellyfaetog.—School; Mr. Thackeray, architect, Town Hall, Merthyr.

Great Oakley.—Additions to parish church; the Vicar.

Grimsby.—Adaptation of Spring Church buildings for offices for Borough Engineer and Treasurer; Mr. H. G. Whyatt, Surveyor, Grimsby Town Council.

Haltwhistle.—Offices and cottages; Plenmellor Colliery Company, Ltd., architects.

Haslingden.—Converting farm buildings into Boys' Home; Messrs. T. Tattersall, Ltd., builders.

Heightcliffe.—Residence (1,000*l.*); Messrs. Sharp & Waller, architects, Brighouse.

Horninglow (Burton-on-Trent). — Vicarage and mission-room; the Vicar.

Invergordon. — Extensions to academy (2,500*l.*); Mr. J. J. McBeth, architect, Queen's House, Inverness.

Inverness.—Skating-rink (2,000*l.*); Messrs. Ross & Son, architects, Queen's Gate, Inverness.

Keighley.—Skating-rink; Messrs. W. & A. Sugden, architects, Keighley.

Liverpool.—Additions to Southern Hospital (5,000*l.*); Messrs. Jones & Son, builders, Heasant-street, Liverpool.

Llanhilleth.—Twenty-six houses, for the Cwmeynew Building Club.

Londonderry.—Music-hall, Strand-road; Mr. J. Mulholland, architect.

Lothianburgh.—Golf Club-house; Mr. J. Morrison, architect, 21, York-place, Edinburgh.

Newcastle.—Offices, Westgate-street; Mr. W. Bell, architect, Central Station, Newcastle.

Northumberland Heath. — Vicarage, St. Paul's (2,000*l.*); the Vicar.

Nuneaton.—Skating-rink; Mr. G. F. Ward, architect, 71, Colmore-row, Birmingham.

Oxhey (Herts).—Parish hall, Pinner-road; Mr. Austin Dearst, architect.

Plymouth.—The Town Council has passed the following plans:—Premises, corner of Gascoyne-place and Beaumont-place, Mr. R. E. Cocks; twelve houses, Wembury Park-road, Messrs. Shellabear & Son; saw-mill and engine-house at timber works, Sutton-road, Messrs. Edred Marshall, Ltd.

Pontypool.—Additions to reformatory; Mr. W. H. D. Caple, architect, Church-street, Cardiff.

Port Sunlight.—Institute (1,000*l.*); Messrs. Ford & Son, builders, Birkenhead.

Rathdown.—Sixty houses; Mr. R. M. Butler, architect, Dublin.

St. Paul's Cray (Kent).—Additions to Cray Valley Cottage Hospital (2,025*l.*); Mr. St. Pierre Harris, architect, 8, Laurence Pountney-hill, E.C.; Messrs. H. Somerford & Son, builders.

Southampton.—The Town Council have passed the following plans:—Offices and store, Floating Bridge-road, also six houses, Beach-road, Clarendon-road, and Richville-road, Messrs. Weston & Burnett; six houses, Harborough-road, Mr. A. G. Fry; thirty-five houses, Harborough-road, and Newcombe-road, Mr. W. H. Masters; six houses, Holyrood-avenue, Mr. A. W. Bricknell; alterations to the Alma Inn, Alma-road, Messrs. Mitchell, Son, & Gutteridge; four houses, Highfield-lane, Mr. F. W. Young, jun.; thirty-six houses, Coventry-road, Mr. C. H. Wilkins.

Stretford (Manchester).—The following plans have been passed:—Alterations, etc., to Talbot House Schools, for the Royal Schools for the Deaf and Dumb; five houses, Ayres-road, Mr. Thomas Emery.

Torpoint.—School (5,000*l.*); Mr. W. E. Bennett, builder, Bodmin.

Walsall.—The Town Council has passed the following plans:—Presbytery, Blue-lane, Rev. H. McDonnell; particular Baptist church, Midland-road, for the Trustees; alterations and additions to premises, Freer-street, Messrs. J. & W. Griffin, Ltd.

Walsoken.—School; Mr. H. Green, architect, Castle Meadow, Norwich.

Welshpool. — Hospital; Mr. G. Snook, Borough Surveyor, Welshpool.

Whitecraigs.—Residence (2,000*l.*); Mr. C. Menart, architect, 241, West George-street, Glasgow.

Competition News.

GRIMSBY TOWN HALL EXTENSION SCHEME.

The minutes of the Finance Committee having reference to the Town Hall extension scheme were considered at a meeting of the Town Council on the 10th inst. They set forth the award of Sir Alfred Gelder, the assessor in the competition, and recommended the payment of the premiums which had been offered. In the course of a discussion, Alderman Sir George Doughty, M.P., said that he had been a prime mover in the scheme so far as it had gone. He had no desire to push the scheme on to the town against its wish. So far the Council had gone as far as his resolution asked them to go. Everyone agreed that an extension of the Town Hall was necessary, and the only question was the expediency of the time when it should be carried out. He was quite ready to support the amendment to erase the words "three months." He had suggested in Committee "a reasonable time." He was willing to await the settlement of the Immingham-road question, and then if it could be shown that the Town Hall scheme could be gone on with without burdening the ratepayers, they might go on with it. The Council agreed to the deletion of the words "three months," and adopted the minutes.

THE STOKE-ON-TRENT TOWN HALL SCHEME.

A special meeting of the Stoke-on-Trent Town Council was held on the 10th inst. to consider a report by the Council in Committee with respect to the Town Hall extension scheme. The Committee had recommended that Messrs. Wallis & Bowden be engaged to prepare a new set of plans on their assurance that the work could be carried out in the way proposed for 24,000*l.*—Alderman Geen moved the adoption of the report, and on being asked for an explanation of the financial aspect of the scheme said he thought the best time for the statement as to ways and means would be when it was proposed to accept the tenders for the work. When the time arrived, not only he, but other members of the Corporation would place a satisfactory scheme before the Council. A long discussion took place, but it was eventually decided that before appointing the architects a sub-committee should confer with Alderman Geen on that point.

Trade Catalogues.

WE have received from the Engineering Department of the National Electric Lamp Association of America a pamphlet describing all kinds of miniature and low-voltage tungsten lamps. These lamps are used for lighting when the pressure is only from 1·5 to 20 volts. They are particularly useful for motor-cars and for dental and surgical work. As their efficiency is three times higher than carbon-filament lamps, much lighter batteries can be employed. The data given in the pamphlet are all thoroughly trustworthy. We regret that there is no corresponding association in this country whose reports would carry equal weight with the general public.

The Electric and Ordnance Accessories Company, Ltd., of Aston, Birmingham, have sent us a catalogue of their electric cooking and heating apparatus. Many novel types of apparatus are illustrated, and full information given as to the cost of operating them. Electricity can be used most usefully and economically when only small quantities of heat are required, as in certain cooking operations, for flat-irons, curling-tongs, cigar-lighters, etc. Those who have experienced the cleanliness and convenience of electric heating only return to the older methods when their meter bills become excessive. The tables given in this catalogue will enable anyone to calculate at once the cost of electric heating. We strongly recommend users of electricity to send for this catalogue.

BOOKS RECEIVED.

BUILDING CONSTRUCTION: ADVANCED COURSE. By Charles F. Mitchell and George A. Mitchell. Sixth Edition. Pp. 864. (B. T Batsford. 6s.)

SURVEY OF LONDON, VOL. II. CHELSEA. Part I. Pp. 87, and 94 Plates. (Committee of the Survey of the Memorials of Greater London. 25s.)

THE CHURCHES OF COVENTRY. By Frederic W. Woodhouse. Pp. 99. (George Bell & Sons. 1s. 6d.)

Correspondence.

REINFORCED CONCRETE.

SIR,—With reference to the note appended to the letter of "Londoner" in your current issue, I think that in England Homan was the first to form floors with rolled joists embedded, as he did such work for me in 1869.

A system of reinforced concrete floor construction was about this time introduced by one Hyatt, and in 1875 I made use of it extensively by constructing floors of about 9-ft. span with 3-in. by ¼-in. wrought-iron bars spaced 3 ft. apart, bedded about 1 in. from underside of the concrete with ⅜-in. round rods threaded through the bars 1 in. from bottom so as to supply the necessary tensional strength to the lower part of the concrete. C. HARSTON.

*** We perfectly remember Thaddeus Hyatt's system, and saw some of his beams tested at Kirkaldy's at the time they were first proposed; but our impression from the tests (and we believe Mr. Kirkaldy's also) was that there was no real unity of action between the iron rods and the concrete. Still, it was an early suggestion. If we remember right, Hyatt was an American.—ED.

SIR,—In erecting the first concrete houses at Bexley Heath, Kent, in 1864, twisted hoop-iron was embedded in the walls and flat roofs: the concrete was composed of Medina cement mixed with gravel and sand. This cement for concrete construction proved a failure, so after that costly experience Portland cement of the highest grade only was employed in the numerous structures that I erected in various parts of the United Kingdom, and continued to erect with the greatest success up to 1879, when

all the forces of English prejudice seemed to be directed against the further uses of concrete for fireproof construction in this country. I then issued a challenge in the building papers for 200*l.* a side that I would construct a 9-in. concrete wall of given dimensions that would be ten times stronger and much cheaper than one erected by any opponent in brick or stone, but no builder accepted this offer, so for the time being concrete construction was discarded in England. Since then our friends over the water have reintroduced various systems of reinforced concrete here, some of them I may say perfect, others I should be afraid to recommend. JOSEPH M. TALL.

ELTHAM PARISH HALL COMPETITION.

SIR,—I have just received from the Hon. Secretary the conditions for the proposed new parish hall at Eltham.

After stating the accommodation, etc., required, and that the total cost is not to exceed 2,000*l.*, the conditions go on to say:—"The Committee invite designs, together with a specification and estimate, for the erection of the above, and undertake either to appoint the architect of the selected design to carry out the work, or to pay him a premium of 15 guineas for such design. The design selected in any case to become the absolute property of the Committee."

Now, I may be under a misapprehension, I admit, but it seems to me that this is tantamount to saying that the Committee really do not see the necessity of paying an architect to carry the building through, but that on the face of it, it would be too glaring a statement to make, were they to say so right out. So they get over the difficulty by undertaking "*either* to appoint the architect of the selected design to carry out the work, *or* pay him 15 guineas for such design."

This, being interpreted, means that having from the poor deluded architect a specification and estimate (*vide* conditions), in addition to the design, it is an easy matter to palm him off with a paltry 15 guineas, and then get some builder to carry out the work according to the design and without the aid of the long-suffering architect.

It is time something were done to put a stop to this sort of thing, and to prevent unscrupulous builders from undertaking works of any importance without the supervision of a properly-qualified architect. A SUFFERER.

ST. ALFEGE, GREENWICH.

SIR,—I should be glad if you would be able to afford space for some further remarks on this church, of which an excellent illustration appears in the current number of the *Builder*. Having examined the building on several occasions it seems evident that the tower up to the main ridge is Hawkesmore's work, it having all the appearance of being part of the original design. Above this height the work of John James begins, consisting of the belfry and steeple, which are quite characteristic of him, showing a more "correct" and less original treatment than Hawkesmore would probably have adopted.

It was apparently an object with Hawkesmore in designing his churches that a large square hall should constitute his *tour de force*, and in the present instance, as in others, it will probably be allowed that he has by this means produced an impressive effect in the interior; and the exterior is in thorough accord. Externally the bold elliptic arch spanning the recessed portion at the east end, and the Doric order on an imposing scale on either side is a truly noble piece of work. Viewed from any point, the church can hardly fail to arrest the attention of the passer-by, the effect being broad and dignified, in a great measure owing to the unstinted use of Portland stone for the whole structure.

Deposited in the church, the story goes, were four pictures, which some thirty years since the Vestry sold for a few pounds to a purchaser, who parted with them for some thousands, much to the dismay of the Vestry, who brought a fruitless action at law for their recovery. The portrait, on glass, of Humphrey Duke of Gloucester may have been one of them. Perhaps your readers may afford some information on these pictures. R. W. COLLIER.

INSECTS IN TIMBER ROOFS.

SIRS,—I herewith enclose sample of some maggots and beetles which I have found in the oak roof beams of Thornham Church, Norfolk.

They are entirely eating the wood away; the maggots seem to eat right into the wood, and the beetles fall down on to the floor.

Do you know of another similar case, and if there is anything you can dress the wood with to stay it from going further? Will you kindly ask your readers? R. SHANKS.

Obituary.

MR. ROBERT HALL.

The death took place early on the 6th inst., at his residence in Galashiels, of Mr. Robert Hall, sole surviving member of the firm of Messrs. R. Hall & Co., builders. Mr. Hall joined the firm over fifty years ago. The firm has erected many public buildings and mansions throughout Scotland and in the north of England, their latest important erection being the Technical College at Galashiels.

MR. R. H. BULLEN.

The death took place on Monday, at his residence, 40, Cumberland-avenue, Liverpool, of Councillor Robert Henry Bullen. Mr. Bullen, who was in his 76th year, was long associated with the building trade, first under the style of Clegg & Bullen, and later as Bullen Brothers & Sons, Ltd.

General Building News.

MORAVIAN CHURCH, BELFAST.

A new church has been erected at Cliftonville-circus by the Moravian Congregation. The building is of brick, with Giffnock stone dressings. The roof is covered with olive-green slates on the main building, and with red tiles on the tower and south porch. At present only the first section of the church is completed, to seat 400 persons, but the plans provide for an enlargement to ultimately accommodate 550 persons. The walls generally are finished in plaster, which is relieved by stone dressings in places, or by Keen cement jambs. The ceiling is open timber, with constructional timbers exposed. The chancel furniture has been made by Messrs. Bell & Mayrs. The general contractors for the building were Messrs. Henry Laverty & Son. The plumbing and gas-piping has been put in by Mr. J. Milliken. The gas fittings, pendants, and brackets were made by Mr. George Jones, who also supplied the gates and railings. The glass work and leaded lights have been executed by Messrs. Ward Partners. The entire cost amounts to about 3,000*l.* Mr. J. St. John Phillips, architect, of Belfast, prepared the plans.

CHURCH IMPROVEMENTS, GILCOMSTON.

Some improvements have been effected at the Gilcomston U.F. Church. The work has been carried out under the supervision of Messrs. A. Marshall M'Kenzie & Sons, architects. The contractors were:—For painting and glazing, Messrs. George Donald & Sons; woodwork, Mr. William Dawson, Huntly-street; electric installation, Messrs. A. B. Robertson & Son; electric fittings, manufactured by Messrs. W. A. S. Benson & Co., London.

CHURCH EXTENSION, ABERGAVENNY.

Holy Trinity Church, Abergavenny, is being enlarged. The plans, prepared by Mr. E. A. Johnson, architect, provide for the erection of a north aisle to correspond with the south aisle, and a vestry. The estimated cost of the work is 1,250*l.* Messrs. J. G. Thomas & Sons, builders, of Abergavenny, are carrying the work out.

ST. SWITHIN'S, NORWICH.

A scheme of restoration has been carried out at this church. A new west window has been put in, and a carved oak screen erected at the foot of the sacrarium steps. The floors have been levelled and reformed with pitch-pine blocks, and the old stone slabs and brasses refixed in the floors. The windows have been restored and reglazed, the plaster to the walls repaired, and the church is now warmed by radiators and lighted by electricity. Immediately adjoining the church to the north-east there has been built a parish hall, with recreation-rooms, scullery, etc. These new buildings are also, like the church, lighted by electricity and warmed by hot-water radiators. The building work has been done by Messrs. J. Youngs & Son, of Norwich, under the direction of Mr. Herbert Green, the Diocesan Architect and Surveyor. The iron railings and the heating have been executed by Messrs. Barnes & Pye, of Norwich; the cast leadwork to the roof by Mr. J. T. Gibson, of Norwich; the electric light installed by Mr. C. W. Hagg, of Norwich; and the carving executed by Messrs. Howard & Son, of Norwich.

NEW CHURCH, NEWQUAY, CORNWALL.

The foundation-stone was recently laid of the new church of St. Michael, at Newquay. The building is estimated to cost between 10,000*l.* and 12,000*l.*, of which over 7,000*l.* has been raised, but it is not intended to proceed at present with the chancel and tower. When completed, the total length of the church will be 139 ft., 39 ft. being taken up by the chancel, and seating accommodation will be provided for 1,000 persons. Local stone will be used in the construction. Dressed Cornish granite is to be utilised for the windows and quoins, St. Columb worked stone for the external walls, and blue Polyphant stone for the pillars of arcades. The flooring will be of oak, and the roof slated. Mr. J. N. Comper is the architect, and Mr. Ambrose Andrews, of Plymouth, the builder.

NEW CHURCH, PARTICK.

Balshagray Church, Partick, which has been erected at the junction of Broomhill-drive and Crow-road, has now been opened to public worship. The church, which provides accommodation for 800 people, and has been erected at an estimated cost of about 6,000*l.*, is of red freestone. It has been built from plans by Messrs. Stewart & Paterson, Glasgow.

EPISCOPAL CHURCH, GLASGOW.

The foundation-stone was recently laid of the new Episcopal Church of St. Mark's, Kinning Park. The new building, after the design of Mr. R. S. Lorimer, A.S.R.A., Edinburgh, will be built with red sandstone. The nave and aisle now in course of erection will, when completed, accommodate 250 worshippers. A small hall, in addition to the church, is now being built. The cost of the work is to be about 2,800*l.*

PLYMOUTH CORPORATION GRAMMAR SCHOOL.

The North-road School, which was built in 1895-6 by the old Plymouth School Board, from plans by Messrs. Hine & Odgers, architects, has been adapted to the purposes of a secondary school, under the Plymouth Education Authority, and is henceforth to be known as the Plymouth Corporation Grammar School. The alterations have been made by Mr. G. B. Turpin, under the direction of Messrs. Hine, Odgers, & May. The total cost has been about 1,000*l.* The central halls on both floors have been retained, but at one end of each of them is a folding partition, which will make two additional classrooms. The central hall on the ground floor is to be fitted as a gymnasium, for which, with its wood-block flooring, it is admirably adapted. Some of the classrooms have been fitted as laboratories—for chemistry, for physics, and for demonstration lessons; one room has been devoted to the teaching of cookery, and new buildings have been constructed for woodwork and metal-work classes.

INFANTS' SCHOOL, LOCHORE, FIFE.

A new school, named the Ballingry Infant School, has been opened at Lochore. The new building is to provide accommodation for 400 pupils, and will cost about 5,000*l.* Altogether there are eight apartments—a large hall, 60 ft. by 27 ft. 6 in., and seven classrooms, 25 ft. by 25 ft. Messrs. And. Scobie & Son, architects, Dunfermline, prepared the plans, and the contractors were:—Mason, Mr. James M. Clark, Dunfermline; joiner, Mr. D. Rattray, Lochore; plumbers, Messrs. Alex. Rolland & Son, Dunfermline; plasterers, Messrs. A. A. Hutchison & Sons, Kinross; slater, Mr. John Robertson, Dunfermline; painter, Mr. David Louden, Kirkcaldy; and heating, Messrs. D. Lowe & Sons, Edinburgh.

KING'S NORTON GRAMMAR SCHOOL.

The ancient half-timbered building that stands on the north side of the churchyard of King's Norton Church, and which is known as the "Old Grammar School," is to be restored. A committee appointed by the parish vestry, with the vicar, the Rev. Hugh Price, as chairman, have the scheme in hand, and Mr. J. A. Cossins is acting as their advisor, while the actual work of repair is being carried out under the superintendence of Messrs. William Hale & Son. The old roof tiles are to be relaid, and the inequalities of the old roof surface are allowed to remain unstraightened, and all evidences of the various alterations made in the sizes and positions of the various windows and other parts will be carefully maintained. The estimated cost of the work is 250*l.*, and for this an appeal is now being made.

BOARD SCHOOL, FINDOCHTY.

A new school has been opened by the Findochty School Board. The buildings have cost about 2,000*l.*, and form part of a plan for a complete new school, of which only the infant department has been erected. The architect was Mr. R. B. Pratt, Elgin.

SCHOOL, CARNETOWN.

A new mixed school has been erected at Carnetown, Abercynon. The building is of native stone, with red wilderness stone and red brick dressings. Ventilation is secured by means of ridge extract ventilators and by hopper inlets. The building is heated by a low-pressure hot-water apparatus, and has in addition open fireplaces in each room. The

building has been erected by Mr T. F. Howells, builder, Cardiff and Caerphilly, from plans by the Architect to the Mountain Ash Education Committee, Mr. W. H. Williams.

NEW SCHOOL, SCOTSTOUN.

The Victoria Drive School, Scotstoun, has now been completed and opened. The school is three stories in height, and is planned on the corridor system. On the ground floor is the infant department, attached to which is a large assembly hall, divided from main corridor by a series of arches. On the first floor is the junior department, also with large hall corresponding to that of infant department. The upper floor is devoted to senior and higher grade departments. The heating is by means of radiators on the low-pressure system. The ventilating is by mechanical extraction fans, driven by electric motors, being fitted in the roof. In out-buildings provision has been made for teaching of cookery, laundry, and manual work. A gymnasium has also been provided. The architects are Messrs. Kerr & Watson, Johnstone, and the measurers Messrs. Shearer & Marr, Glasgow.

NATIONAL SCHOOL, DONAGHY.

A national school has been built at Donaghy, near Cookstown. The new building, which is a stone and lime structure, affords accommodation for seventy pupils. It was designed by Mr. A. M. Brennen, C.E., Cookstown, and the builder was Mr. John Forrest, of the same town.

COUNCIL SCHOOLS, RAMSGATE.

Council schools have been erected in Lilian-road at a cost of 10,600*l.* by Messrs. W. J. Ballard & Co., to plans prepared by the Borough Engineer, Mr. T. G. Taylor. The schools have a frontage of 324 ft. and a depth of 118 ft., and will provide accommodation for about 760 children. There are separate entrances for the boys and girls; their recreation-grounds are apart, as are also the class-rooms.

HIGH SCHOOL, STRANRAER.

The Stranraer School Board have decided to build a new high school, and have secured a site in Lewis-street for the purpose. Messrs. Barclay, Glasgow, have prepared the plans for the proposed work.

COUNCIL SCHOOL, LYDBROOK.

A new Council school has been opened at Lydbrook. The building, designed by Mr. M. H. Medland, County Architect, was built by Messrs. Crane, of Nottingham, under the supervision of Mr. W. Wiggall, clerk of works, at a cost of about 3,800*l.* The heating installation, which is upon the hot-water principle, was put in by Messrs. Bevan & Sons, of Gloucester. Accommodation is provided for about 250 children (176 mixed and seventy infants), and there are separate departments for boys, girls, and infants, with sliding partitions so that the rooms may be divided when occasions require. There is also a private room and storeroom, together with cloakrooms and lavatories. The building throughout is lighted with oil. There are also separately-built cookery and laundry and manual training rooms, with the usual offices.

TECHNICAL SCHOOL, BURNLEY.

A new technical school has been erected at Burnley. The school, which is from the designs of Mr. G. H. Pickles, the Borough Engineer, has been built on land in Ormerod-road, purchased for 5,000*l.* The building itself and its equipment have cost about 50,000*l.* The central hall has a holding capacity for about 800 persons. Accommodation is provided for 1,351 evening students and 736 day students.

PARISH HALL, WALLSEND.

A parish hall is being erected in St. Luke's parish, Wallsend. The building will be built of concrete blocks from designs furnished by Messrs. Frank Caws, Steel, & Caws, Sunderland. The cost will be 1,700*l.*

PARISH-ROOM AND VICARAGE, BURTON.

A parish-room and vicarage are to be built in Horninglow parish. The plans have been drawn up by Messrs. Currie & Thompson, of Derby, and the total cost of the buildings will be about 2,000*l.*

NEW BARRACKS, EGYPT.

Messrs. Henry Lovatt, Ltd., of Wolverhampton, have been appointed contractors for the erection of barracks at Abbasia, near Cairo, for the English Army of occupation. The blocks will be constructed of concrete, and will be similar to those built by them on Salisbury Plain. Mr. Harry B. Measures is Director of Barrack Construction to the War Department.

ENLARGEMENT OF A HYDRO AT BOURNEMOUTH.

The Durley Dean Mansion Hotel and Hydro, on the West Cliff, Bournemouth, has been enlarged. The additions embrace a dining-room, capable of accommodating 250 persons, on the ground floor, above being four stories of bedrooms, and in the basement kitchens, boiler-house, etc. In addition the existing building has been remodelled. An electric lift (by Waygood) has been introduced to all the floors. The architects were Messrs. Hawker & Mitchell, and the builders Messrs. Jones & Seward, while Messrs. Cochrane, of Cannon-street, were responsible for the heating and kitchen arrangements.

PROPOSED NEW INFIRMARY, PERTH.

A site is being acquired at Tullylumb on which to erect the new Perth City and County Royal Infirmary. A sketch-plan, prepared by Mr. James Miller, architect, Glasgow, provides for a hospital with 120 beds, at an estimated cost of 36,800*l.*

CONVALESCENT HOME, PORTHCAWL.

Extensions have been made to the Rest Convalescent Home, Porthcawl. Colonel E. M. Bruce Vaughan was responsible for the design of the new buildings, which have cost, including furnishing, 9,755*l.*

BUILDING IN UPPER RENFREWSHIRE.

At a recent meeting of the Building Committee of Upper Renfrewshire, intimation was given of the intention to erect the following buildings:—Villa in Kirkhill, Mansewood, for Thomas Hendry, 33, Renfield-street, Glasgow; nine tenements in Yoker-road, Yoker, for William Anderson, jun., 49, Bellfield-street, Glasgow; double villa in Nevis-road, Hill-park, for John Taylor, Victoria-street, Lark-hall; cottage at Old Hall, Paisley, for David Brown, jun., 15, Greenlaw-avenue, Paisley; two tenements at the corner of Garry-street and Spean-street, Cathcart, for Richard Henderson, 116, Hopé-street, Glasgow; double cottage in Hillhead-road, Crookston, for John Young, Lennox-road, Crookston; double cottage in Busby-road, Clarkston, for James Lindsay, Brisbane-road, Largs; infant school and laundry block at Yoker Public School, for the Renfrew Landward School Board; double cottage in Holehouse Brae, Neilston, for Mrs. J. Quin, Neilston; and ten double cottages in Paisley-road, Barrhead, for Messrs. Young & Pollock, Main-street, Neilston.

IMPROVEMENTS AT THE RAILWAY-STATION, WORTHING.

It is announced that Messrs. J. Longley & Co., of Crawley, have secured the contract for the rebuilding of the railway-station in this town. The old buildings on the down side will be demolished, and the new portion will occupy nearly 10,000 ft., and on the space formerly covered on the up side (where a new island platform will be constructed), 2,755 ft. This island platform, which will be on the north side, will be about 640 ft. long and 40 ft. wide, and on it will be erected waiting-rooms, refreshment-room, and lavatories. The buildings will be constructed of Portland stone and red bricks, with slated roofs. The main structure will have a frontage to the Railway Approach of 250 ft.

PUBLIC WASHHOUSES, MANCHESTER.

The Manchester Baths Committee are about to erect public washhouse and wash-baths in Armitage-street, Hyde-road, Ardwick. The new establishment, when complete, will have thirty-five washing-stalls, with all essentials, twenty-one wash-baths for males, and twenty-two wash-baths for females. The estimated cost is 10,000*l.*, and the scheme will be completed in from six to eight months' time. Mr. H. Price, the City Architect, is responsible for the plans, and the work is being executed by Mr. Normanton, contractor.

INFECTIOUS DISEASES HOSPITAL, KILMARNOCK.

The infectious diseases hospital which the Corporation of Kilmarnock has erected at Kirkland-side is now open. The hospital consists of seven different blocks, and stands within grounds extending to about 22 acres, the total cost of buildings, furnishings, site, etc., amounting to about 20,000*l.* Provision has been made for forty-eight beds. Mr. James Hay, architect, prepared the plans.

ESTATE DEVELOPMENT, CHELTENHAM.

In the district known as Leckhampton Hill several estate development schemes have either been begun or are proposed. The Battledown Brickworks is a scheme in progress for which Messrs. Webb Brothers, Ltd., are responsible. At Pilford a road will be built jointly by Messrs. Webb and J. Dale to open up the property of each. Further up the hill a syndicate has bought from the Carrington estate half a mile of frontage to Leckhampton Hill-road and to Daisybank-road. They propose to erect all classes of houses, from workmen's cottages in Daisybank-road and Lower Pilley for the convenience of workmen, gardeners, coachmen, chauffeurs, etc., now employed on Leckhampton Hill, to 40*l.* a year houses in the more prominent positions. In addition to the Pilford new road off the Pilley-road, there will be two roads constructed from Leckhampton pitch in order to develop fully the latest garden suburb. Messrs. Prothero, Phillott, & Barnard are preparing plans for this work.

NEW BUILDINGS IN LONDON.

Parish hall, Flower-lane, Mill Hill, Hendon, N.W. (2,360*l.*), for the churchwardens of the parish church. Shops, etc., Tooting-broadway, S.W.; architect, Mr. C. Granville Baker, 5, Bloomsbury-square, W.C.; builder, Mr. F. W. Fletcher, Maybury-street, Tooting. Electric theatre on site of No. 24, Tottenham Court-road, W., for the Living Picture Company, 15, Britannia-street, W.C. Extensive alterations to mansion, Halkin-street, W.; builders, Messrs. Waring & White (1906), Ltd., 1A, Cock-spur-street, W. Italian hotel and restaurant; builders, Messrs. Watson & Co., 10, Glass-house-street, Regent-street, W. Skating-rinks, Hammersmith, W., and Shaftesbury-avenue, W.; Roller Rink Construction Company, 6, Cherry-street, Birmingham. Buildings, corner of Holborn and Featherstone-buildings; builder, Mr. J. Waddington, 59A, Carter-lane, St. Paul's, E.C. Extensive buildings, Shaftesbury-avenue, W.C.; builders, Messrs. J. Parkinson & Son, Ltd., Blackpool. Buildings, Shaftesbury-avenue, W.C.; builder, Mr. B. E. Nightingale, Albert-embankment, S.E.

THE VINTNERS' HALL.

The Vintners' Company are making an extension to their hall in Upper Thames-street. They have now built over the forecourt and the small wings that stood on either side. The architect is Mr. A. H. Kersey.

Stained Glass & Decoration.

MEMORIAL WINDOWS, TRINITY CHURCH, GLASGOW.

Two stained-glass memorial windows have been erected in this church. The windows have been designed and executed by Mr. Stephen Adam, jun., Glasgow, and occupy a position in the west transept of the church. They each consist of three compartments, and illustrate outstanding incidents in the life of Christ.

Sanitary and Engineering News.

WATER TOWER, YORK.

A large water tower of 100,000-gallons capacity is being erected on a plot of land between Leeman-road and the river Ouse, at York, for the North-Eastern Railway Company. The tower, octagonal in shape, will be 104 ft. high and 30 ft. in diameter, and will be constructed on the Khan system of reinforced concrete. At each angle, and in the centre, are three concrete piles about 60 ft. long, driven into the ground by means of a ram, and laced together with tie-rods. On these will be erected a concrete superstructure reinforced by steel rods about an inch in diameter, and at the top will be a tank capable of holding 100,000 gallons of water, weighing, on a basis of 10 lb. per gallon, about 446½ tons. The concrete piles and blocks are being moulded on the spot. The principal object in view in erecting the tower is to secure an adequate pressure of water for various purposes at the railway-station, particularly for washing out locomotive boilers, etc. The task of piling the foundations is now in progress. A tower of similar construction and height, but with a tank of smaller capacity—about 20,000 gallons—is to be erected at the Holgate-road Carriage Works. Messrs. W. Moss & Sons, Loughborough, are the contractors.

ST. ANDREWS WATER SCHEME.

At a recent meeting of St. Andrews Town Council it was reported that the Water Provisional Order had now received the Royal assent. In connexion with the Cameron water scheme the Council have appointed Mr. William Watson, the Burgh Surveyor, to be engineer for the scheme, and Mr. A. Balfour Craig, the Assistant Surveyor, to the position of resident engineer.

LISS MAIN SEWERAGE.

The Petersfield Rural District Council have adopted a scheme of sewerage and sewage disposal for the parish of Liss, Hampshire, prepared by Mr. Harry W. Taylor (Messrs. Taylor, Wallin, & Taylor), of Newcastle-upon-Tyne and Birmingham. The sewage will be collected by a series of sewers in the village, and conveyed down the valley to the outfall works near Andlers Ash: here it will be pumped by oil engines and centrifugal pumps into a receiving tank, and from this it will pass through hydrolitic and detritus tanks, a

percolating filter, and finally over 2 acres of land, the effluent ultimately discharging into the River Rother. The estimated cost of the works is 4,000*l.*

NEW BRIDGE, STAKEFORD.

A new bridge across the Wansbeck at Stakeford has been opened to the use of the public. The bridge connects the villages of North Seaton and Stakeford, on the opposite sides of the river. The bridge is 264 ft. long, between abutments, and is divided into six spans of 44 ft. each. There is a 20-ft. carriage-way and footpath. The borings showed that the rock for the foundations was up to 37 ft. deep, and the structure is carried by ferro-concrete piles. The bridge is constructed to carry a moving load of 30 tons. The whole of the structure is of ferro-concrete on the Hennibique system. About 1,600 ft. of fenced roads have been cut as approaches. The engineers were Messrs. D. Balfour & Son, and the contractors Messrs. Brims & Co., both of Newcastle. Mr. H. Middleton and Mr. T. Lowes were the resident engineers, and the Union Cement Company, Newcastle, supplied the cement for the contract.

Miscellaneous.

THE ILLUMINATING ENGINEERING SOCIETY.

The draft constitution of the above Society, having for its object the study of the science and art of illumination, was formally adopted on May 25 of this year. Professor S. P. Thompson, D.Sc., F.R.S., has now consented to become the first President of the Society, and influential support has been received from many distinguished authorities on matters of illumination in this country, on the Continent, and in America. In addition, a representative Council has now been formed. Anyone interested in the objects of the Society and desiring to become a member is invited to apply to Mr. L. Gaster, Hon. Secretary, 32, Victoria-street, London, S.W.

THE INSTITUTE OF METALS.

At the autumn meeting of the Institute of Metals, which will be held at Manchester on October 14 and 15, it is expected that the following papers will be presented:—Messrs. J. H. Andrew, M.Sc., and C. A. Edwards, on "The Constitution and Properties of the Ternary Alloys Aluminium, Copper, Tin"; Messrs. C. O. Bannister, Assoc.R.S.M., and H. J. Tabor, on "The Surface Appearance of Solders"; Mr. H. W. Greenwood, on "The Technical Assay of Zinc"; Mr. J. S. Glen Primrose, on "Notes on the Production of Pure Spelter"; Mr. E. L. Rhead, on "Some Causes of the Corrosion of Copper and Brass"; Professor C. A. Smith, M.Sc., on "The Elastic Breakdown of Ductile Materials"; Professor T. Turner, M.Sc., and Mr. M. T. Murray, M.Sc., on "The Copper-zinc Alloys—a Study of Volume Changes during Solidification." Applications for membership of the Institute of Metals to permit of election prior to the Manchester meeting should be sent in to the Secretary, Mr. G. Shaw Scott, M.Sc., Caxton House, Westminster, S.W., on or before Saturday, September 25.

PROPERTY SALES.

From the account of some property sales at Clapham Common and Wandsworth Common contained in the *Times*' weekly review of the property market, it does not appear that these districts would be a fruitful source for "increment value." For a freehold property with a large garden, 56 ft. frontage to the road, a carriage sweep, and with a well-fitted billiard-room, put up at the upset price 1,250*l.*, no bids were forthcoming. This property was stated to have cost over 3,000*l.*, and until a few months ago to have been mortgaged for 1,500*l.* A leasehold property, with some sixty years to run, at a ground rent of 36*l.* 5s., a corner site, with a large garden and motor-house, was withdrawn at 900*l.* "The community" appear to have brought "decrement" rather than "increment" to this suburban area.

NATIONAL PORTRAIT GALLERY.

Mr. Charles John Holmes, M.A., Slade Professor of Fine Art in the University of Oxford, has been appointed to be Director, Keeper, and Secretary of the National Portrait Gallery in succession to Mr. Lionel Cust, M.V.O., who will retire at the close of the current month. Mr. Cust, formerly of the Prints and Drawings Department, British Museum, succeeded the first Director, Sir George Scharf; Mr. Holmes is the editor of the *Burlington Magazine* and a member of the New English Art Club.

CUSTOM-HOUSE, KING'S LYNN.

In a communication to the *Times* Mr. F. D. Mackinnon directs attention to the disfigurement with modern brick chimneys, topped with chimney-pots and ranged around the central platform of the cupola, of the Custom-house at King's Lynn. The building was designed and erected for the Exchange, in 1681, by Henry Bell, a native of the town, and is a beautiful little example of the English Renaissance style. On the ground floor was an open loggia. There is an illustration in Professor Reginald Blomfield's book upon the history of Renaissance architecture in England.

WELSH MONUMENTS AND ANTIQUITIES.

The Royal Commission on the Preservation of Welsh Monuments and Antiquities have been engaged during some weeks upon a survey of the county of Montgomery, where the numerous relics are mostly of a prehistorical character; the counties of Denbigh and Flint will next be surveyed, and the results will be published as soon as they are completed for each county. Mr. Edward Owen is the Secretary to the Commission.

OPEN SPACES AND RECREATION-GROUNDS.

Some extensive improvements, with additions, have been effected at West Ham Park, E., at an expenditure of nearly 4,500*l.* Nine acres in and around the flower gardens are now levelled, a lake having an area of 2,000 sq. yds. has been made out of the swampy hollow, and several tennis-courts with a bowling-green have been laid out. In 1874 the Corporation of the City of London bought the park, now 77 acres in extent, for 25,000*l.*, towards which sum members of the Gurney family and the Corporation contributed 10,000*l.* apiece. The Corporation expended a further amount of 8,000*l.* upon the preparation of the ground, of which the maintenance costs 1,500*l.* per annum. A park and recreation-ground has been opened at Derby, at an outlay of 12,000*l.*, whereof about one-quarter was raised by public subscription to the Mayor's winter distress fund.

GARDEN CITY SCHEME, KNEBWORTH.

The development of the part of the Knebworth estate of the Earl of Lytton which adjoins Knebworth Station, on the Great Northern Railway, has been proceeding for some years on ordinary lines, but, following the example set at Letchworth and at other garden cities, Lord Lytton decided a year ago to have a proper town-planning scheme prepared for his estate. The planning was entrusted to Mr. Thomas Adams in consultation with Mr. Edwin L. Lutyens. It provides for wide main avenues, ample recreation spaces, and large gardens. The average number of houses per acre is less than ten. The property is intersected for about two miles by the Great North Road, and among other features of the plan is the diversion of this road so as to enable it to be widened to three times its present width and planted with an avenue of trees.

NATIONAL ASSOCIATION OF MASTER HOUSE PAINTERS AND DECORATORS.

The National Association of Master House Painters and Decorators of England and Wales opened their sixteenth annual convention in Sheffield on Tuesday. The opening proceedings were presided over by the Lord Mayor of Sheffield, and there were present Sir William Richmond, K.C.B., R.A., Mr James Puttrell (Sheffield), President, and all the principal officers of the Association, as well as many Sheffield members. The Lord Mayor, in extending a cordial welcome to the members of the Association on behalf of the city, took the opportunity of congratulating Mr James Puttrell on the high honour which had been conferred upon him in being elected President this year. The President of the Association (Mr. Puttrell) also gave a hearty welcome to members and friends of the Association, and especially welcomed their fellow craftsmen from the Netherlands. It seemed but a short time since the inception of their Association at Manchester, and they had all been agreeably surprised at its progress and undoubted usefulness. Their desire to cultivate public opinion in all matters pertaining to decorative art was their foremost object. He referred to the foundation of scholarships, the sending of students to Italy to study and specialise in colour, decoration, and other educative measures adopted by the Association. They wanted to provide workmen who would be a credit to the Association and to the nation. If they were to have a fair chance in this direction they must have their youths bound apprentices. The benefit would be mutual. As a Guardian of the Poor he had been surprised at the great number of labourers who had to seek assistance, men who had been allowed to drift on without any trade in their hands, who had become unemployed, and had eventually degenerated and become unemployable. This state of things might to some extent be remedied if there was a better system of apprentices all round. A better class of workmen would thus be secured, and there would be fewer of those who belonged to the unemployable type. Referring to technical education and Government requirements in regard to workmen, the President in regard to the latter said there was to be a liberal supply of soap and water, towel, and various other things so that the workman could wash himself. He thought these were matters in which the workman might very well be left to work out his own salvation. In conclusion, he contended that there was no trade more closely allied to the home life than theirs. It was within their power to make or mar the happiness of those who came within their power and influence. Let them then give thoughtful and happy treatment in home decoration, and not make it depressing by want of harmony. Sir William Richmond next declared the exhibition open. As to the general aspect of their exhibition, he would say that it was decidedly delightful and decidedly desirable. The object of the society which had impressed him most was their work for their youth—the manner in which they were providing for the future of the young people who were entering into their art. If they jogged along selfishly and made only their own path, grinding their corn and sowing none, they would be of no advantage to the nation. It was, therefore, that section which made provision for their youth in which they took the greatest interest. Turning to the exhibition proper, he would like, he said, to see a good deal more attention paid to lettering, and their students should be taken straight to the ancient Roman inscriptions, which were all more or less absolute works of art. He would also like to see more attention paid to the colouring of the letters on the ground. He remembered the time when one entered a drawing-room they were confronted by an extremely disagreeable looking lion lying before their path, in front of the fireplace, and just where they wanted to stand and warm themselves. But that style had been exploded, and these sham wild things had disappeared from the carpet. The distasteful and unhealthy arrangement of rep curtains had also gone. The fact was, people were becoming more educated, and were finding that light was above all things the most beneficent thing Providence had given. He was delighted to see that since his visit six or seven years ago that abominable pall of disgusting smoke which overhung Sheffield was not so thick over their city as it formerly was. He trusted that it would still become thinner, and that the people of Sheffield would be able to keep their houses cleaner and brighter, and would be a happier and healthier people even than they were now. On the motion of Mr. Sibthorne (Dublin), seconded by Mr. Peters (Sheffield), Sir William Richmond was thanked, and also the Lord Mayor for presiding was adopted, on the motion of Mr. A. J. Teall (past President), seconded by Mr J. Standall (Sheffield). At the afternoon session the General Secretary (Mr. W. G. Sutherland) read the annual report, which showed that since the last meeting they had lost nineteen members by death and resignation, but had added to their roll thirty-one new direct members and two associations. The income from subscriptions was the highest yet recorded, reaching £335 19s. 10d. The report was adopted. Later in the afternoon the members of the Association and friends, including numerous ladies, were received at the Town Hall by the Lord Mayor, and were entertained to afternoon tea.

Patents.

APPLICATIONS PUBLISHED.*

16,946 of 1908.—Udo Ribau and Ede von Mandics: Sliding and pivoting windows.

17,002 of 1908.—William Herbert Percy: Reinforced concrete articles, structures, and structural members.

17,758 of 1908.—Reginald Stanley: Machines for moulding tiles.

17,832 of 1908.—Anton Schulz: Appliances for use in connexion with the laying of planks for floors.

23,945 of 1908.—John Stoddart: Fittings for hinging windows.

24,195 of 1908.—Arthur Henry Barker: Combined fireplace and boiler.

732 of 1909.—George Arthur Williams: Lock for sliding doors.

3,334 of 1909.—Edward D'Arcy and Alexander Roberts: Step-ladders.

4,115 of 1909.—John Jeffreys, Edgar Herring, and Percival Michael Brankstone Grenville: Ventilating radiators for heating buildings and the like.

6,287 of 1909.—T. & R. Boote, Ltd., and Charles Edmund Boote: Domestic fireplaces.

* All these applications are in the stage in which opposition to the grant of patents upon them can be made.

List of Competitions, Contracts, etc.

For some Contracts still open, but not included in this List, see previous issues. Those with an asterisk (*) are advertised in this Number: Competitions, iv.; Contracts, iv. vi. viii. x.; Public Appointments. xv.; Auction Sales, xxii.

Certain conditions, beyond those given in the following information, are imposed in some cases, such as: the advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bonâ-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

***** It must be understood that the following paragraphs are printed as news, and not as advertisements; and that while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur.**

Competitions.

SEPTEMBER 28.—**Lyminge.**—SEWAGE DISPOSAL.—The Elham R.D.C. invite schemes and estimates for the disposal of the sewage of Lyminge Parish. Mr. R. Lonergan, Clerk, 11, Cheriton-place, Folkestone.

OCTOBER 1.—**Aberdare.**—HOSPITAL.—The U.D.C. of Aberdare invite competitive designs for a fever hospital for fifty-two patients, including administrative block, outbuildings, etc. Premiums of 100*l*., 50*l*., and 25*l*. are offered for the designs placed first, second, and third respectively. An architectural assessor will be appointed on the nomination of the President of the Royal Institute of British Architects, also a medical assessor to act jointly. Particulars, etc., of the competition, together with a plan of the site, may be obtained from Mr. Thomas Phillips, Clerk, Town Hall, Aberdare, on payment of a sum of 3*l*. 3s.

OCTOBER 11.—**Hull.**—TRAINING COLLEGE.—The Hull Education Committee offer premiums of 150*l*., 100*l*., and 50*l*. for drawings submitted in competition for a new college. For further particulars see advertisement in our issue of July 24.

NOVEMBER 1.—**Kendal.**—TECHNICAL SCHOOL.—The Corporation of the Borough of Kendal invite architects residing and practising in Westmorland to submit a competitive design, together with a written description and estimate for the erection of a technical school in the said Borough. A premium of 15*l*. is offered for the design considered by the Corporation first in order of merit, and further premiums of 10*l*. and 5*l*. respectively for those which are, in their opinion, second and third in order of merit; such designs, on payment of the promised premiums, shall become the absolute property of the Corporation. Particulars, etc., together with the plan of site, showing levels, etc., may be obtained free, on application to the Borough Surveyor. (Mr. J. E. Bolton, Town Clerk.)

NOVEMBER 1.—**Preston.**—GRAMMAR SCHOOL.—The Corporation of Preston invite architects practising as principals to submit competitive designs and plans for a new grammar school for boys, to be erected in Moor Park-avenue, Preston, and estimates for the same. Premiums of 50*l*., 30*l*., and 20*l*. Conditions of competition and plan of site will be sent on application to Mr. Alfred Howarth, Town Clerk, Town Hall, Preston.

NOVEMBER 30.—**Herne Bay.**—PAVILION ON PIER.—The Herne Bay U.D.C. invite designs for pavilion on pier. Two premiums are offered. For further particulars see advertisement in our issue of August 28.

JANUARY 31. — **Cardiff.** — NATIONAL MUSEUM.—The Council invite competitive designs for the erection of a new National Museum at Cardiff. Premiums of 200*l*., 150*l*., and 100*l*. for second, third, and fourth places. Particulars on receipt of a deposit of 2*l*. 2s. from Dr. Wm. Evans Hoyle, Director of the Museums, City Hall, Cardiff. For further particulars see advertisement in our issue of August 28.

NO DATE.—**Bognor.**—PIER IMPROVEMENTS.—The Bognor Pier Company, Ltd., invite designs or suggestions for improvements on the pier. Apply Mr. G. W. Cutts, Secretary, 50, High-street, Bognor.

NO DATE.—**Warrington.**—PUBLIC ELEMENTARY SCHOOL.—The Warrington Education Committee invite competitive plans for the erection of a Public Elementary School. A copy of the conditions of competition, etc., together with a plan of the site, may be obtained on payment of 1*l*. 1s. Mr. J. Moore Murray, Secretary and Director, Education Office, Sankey-street, Warrington.

Contracts.

BUILDING.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

SEPTEMBER 20.—**Adlington.**—SCHOOL BUILDINGS.—The Lancashire Education Committee invite tenders for the erection of a new elementary school for 352 scholars and a manual instruction and cookery block at Adlington, near Chorley. Plans may be seen, and bills of quantities obtained, at the office of the County Architect, Mr. Henry Littler, 16, Ribblesdale-place, Preston, by payment of a deposit of 2*l*.

SEPTEMBER 20.—**Bury.**—SHOP FRONTS.—The Corporation of Bury invite tenders for the rebuilding of the fronts of shops, Nos. 60, 62, and 64, Bolton-street, Bury. Plans may be seen, and specifications, together with forms of tender, obtained, upon application to Mr. Arthur W. Bradley, A.M.Inst.C.E., Borough Engineer and Surveyor, Bank-street.

SEPTEMBER 20.—**Glamorgan.**—SCHOOL ADDITIONS.—The Glamorgan C.C. invite tenders for the following, viz.:—(1) Additions to the Council school at Porthcawl; (2) additions to the Council school at Penybank, Gellygaer; (3) new laboratories, cloakroom, etc., at the County school at Bridgend; (4) alterations to the Skewen Lower Council school, near Neath. The plans, specification, etc., of all the works may be seen or obtained at the offices of Mr. T. Mansel Franklen, Clerk of the County Council, Glamorgan C.C. Offices, Westgate-street, Cardiff.

SEPTEMBER 20. — **Portsmouth.** — ALTERATIONS AND ADDITIONS.—Tenders are invited for alterations and additions to a portion of the north-east corner of the basement floor of the Town Hall to provide accommodation for the Borough Treasurer's Department. Specification, etc., may be seen, and a form of tender obtained, at the Borough Engineer's Office at the Town Hall.

SEPTEMBER 20.—**Smethwick.**—DEPÔT BUILDINGS.—The Corporation of Smethwick invite tenders for the erection of various buildings at their depôt in Rolfe-street, Smethwick. Plans and specifications can be seen, and bills of quantities obtained, at the office of Mr. C. J. Fox Allin, Borough Surveyor, Council House, Smethwick, during office hours. Applications for quantities must be accompanied with a cheque to the value of 3*l*. 3s.

SEPTEMBER 21.—**Abberton.**—BRIDGE.—Lexden and Winstree R.D.C. invite tenders for building a new bridge at Abberton. Plans and specifications can be seen by appointment at the office of Mr. John Ennals, Surveyor, Lexden.

SEPTEMBER 21.—**Bangor.**—HOSPITAL.—Tenders are required for the erection of the Bangor new Hospital. Schedule of quantities, etc., can be obtained from Mr. S. C. Hunter, Scottish Provident-buildings, on payment of 2*l*. 2s., and plans and specification at the office of Messrs. Young & Mackenzie, Scottish Provident-buildings, Belfast.

SEPTEMBER 21.—**Sunderland.**—ALTERATIONS.—Tenders are invited for proposed alterations to the offices of the Sunderland Gas Company, Fawcett-street. Plans may be seen, and quantities obtained, at the office of the architects, Messrs. Wm. & T. R. Milburn, FF.R.I.B.A., 20, Fawcett-street, on deposit of 2*l*. 2s.

SEPTEMBER 22.—**Caerphilly.**—LODGING-HOUSE AND SHOPS.—Tenders are invited for lodging-house and two shops, Caerphilly. Quantities obtainable by deposit of 1*l*. 1s. from Mr. John H. Phillips, F.R.I.B.A., architect, 7, Pembroke-terrace, Cardiff.

SEPTEMBER 23.—**Scunthorpe.**—INSTITUTE.—Tenders are invited for the erection of a Primitive Methodist Institute at Scunthorpe. Plans and specifications may be seen at the office of Mr. W. H. Buttrick, P.A.S.I., architect, Scunthorpe.

SEPTEMBER 23.—**Swansea.**—ELECTRIC POWER STATION.—The Swansea Harbour Trustees invite tenders for the erection of an electric power station on the eastern side of the Prince of Wales Dock Lock. Drawings and specification may be seen, and form of tender obtained, at the office of the Trustees' Engineer, Mr. A. O. Schenk, M.Inst.C.E., Harbour Offices, Swansea.

SEPTEMBER 24. — **Glasthule, Co. Dublin.** — SCHOOLS.—Tenders are invited for the erection of new schools, Glasthule, Co. Dublin, for the Very Rev. Canon Murray, P.P. Bills of quantities may be obtained fom Messrs. Mumby & O'Rourke, surveyors, 15, College-green, on lodgment of a fee of 2*l*. 2s. Mr. J. P. Wrenn, M.R.I.A.I., architect, 16, Nassau-street, Dublin.

SEPTEMBER 24.—**Kingussie.**—RAILWAY STATION IMPROVEMENTS.—The Directors of the Highland Railway Company invite tenders for the various works in the erection of waiting-rooms on up platform, Kingussie Station. Plans may be seen with Mr. William Roberts, the Company's Engineer-in-Chief, at Inverness, or with the Stationmaster at Kingussie; and specifications and schedules of quantities can be obtained from the Engineer-in-Chief.

SEPTEMBER 25.—**Berkhamsted.**—JUNIOR SCHOOL AND HALL. — The Governors of the Berkhamsted Grammar School invite tenders for the erection of a new junior school and hall. Plans and specifications can be seen, and any necessary information obtained from Messrs. G. H. & H. A. Rew, architects, Berkhamsted, from whom quantities and form of tender can also be obtained.

SEPTEMBER 25.—**New Elgin.**—COTTAGE.—Tenders are invited for the various works in connexion with a cottage to be erected at New Elgin. Plans and specifications may be seen with Mr. John Wittet, architect, Elgin.

SEPTEMBER 25. — **St. Breward.** — CHINA CLAY WORKS.—The Directors of the North Cornwall China Clay Company, 1908, Ltd., invite tenders for the erection of a new china clay kiln, sheds, tanks, etc., in the Parish of St. Breward, Cornwall, adjoining the London and South-Western Railway, near Wenford Bridge Station. Plans and specifications may be seen on application to Captain R. M. Richards, Row, St. Breward, or at the office of Mr. T. H. Andrew, Engineer, Market-hill, St. Austell.

SEPTEMBER 28. — **Portsmouth.** — HOSPITAL STAFF BUILDINGS.—Tenders are invited for the erection of a block of buildings for the accommodation of the staff within the grounds of the Infectious Diseases Hospital, Milton. A copy of the bills of quantities, with forms of tender, can be obtained on application to Mr. G. Hammond Etherton, Town Clerk, the Town Hall, Portsmouth, on payment of 2*l*. 2s., and the plans, etc., can be seen at the Borough Engineer's Offices, at the Town Hall, Portsmouth, where any further particulars can be obtained.

SEPTEMBER 29. — **Calstock.**—CHAPEL ALTERATIONS, ETC.—The Trustees of the Calstock Wesleyan Chapel invite tenders for alterations and redecorating to the chapel and schoolroom. Drawings can be seen, and a copy of the specifications obtained, on application to Mr. A. Lawry, Tharsis Villa, Calstock, on payment of 1*l*. 1s.

* SEPTEMBER 29.—**Leicester.**—LABOUR EXCHANGE.—The Commissioners of H.M. Works, etc., invite tenders for erection of a labour exchange at Leicester. See advertisement in this issue for further particulars.

SEPTEMBER 30.—**Canterbury.**—ENLARGEMENT, ETC.—Tenders are invited for enlargements and alterations at the St. Augustine's Sessions House, Longport-street, Canterbury. Plans and specification can be inspected, and the bill of quantities, etc., obtained, at the office of the County Architect, 86, Week-street, Maidstone, on payment of a deposit of 2*l*. 2s.

SEPTEMBER 30. — **Heckmondwike.** — SCHOOL.—The West Riding Education Committee invite whole or separate tenders for the builder, joiner, slater, plasterer, plumber, painter works in connexion with Heckmondwike new School. Plans may be seen, and specifications, with quantities, obtained, on application to the West Riding Architect, County Hall, Wakefield. A deposit of 1*l*. in each case must be sent by separate letter to the West Riding Treasurer, County Hall, Wakefield.

SEPTEMBER 30.—**Portadown.**—DISPENSARY AND RESIDENCE.—The Lurgan Board of Guardians invite tenders for the erection and completion of a new Dispensary and Medical Officer's residence in Thomas-street, Portadown. Plans and specification may be seen at the office of the architect, Mr. J. W. Walby, Portadown. Bills of quantities, prepared by Messrs. M'Carthy & Brooks, surveyors, Scottish Provident-buildings, Belfast, may be obtained from Mr. James Calvert, Clerk of the Union, Clerk's Office, Workhouse, Lurgan, upon payment of 1*l*. 1s.

SEPTEMBER 30.—**Selby.**—SECONDARY SCHOOL IMPROVEMENTS.—The West Riding Education Committee invite whole or separate tenders for additions and alterations to Selby Secondary School. Plans may be seen, and specifications, etc., obtained, on application to the West Riding Architect, County Hall, Wakefield. A deposit of 1*l*. in each case must be sent by separate letter to the West Riding Treasurer, County Hall, Wakefield.

OCTOBER 1.—**St. Andrews, Fife.**—RECONSTRUCTION OF LIFEBOAT HOUSE.—The Committee of Management of the Royal National Lifeboat Institution invite tenders for the reconstruction and enlargement of the lifeboat house at St. Andrews, in the County of Fife, N.B. Plans and specification may be inspected on application to the Local Hon. Secretary, Mr. David W. Rusack, Marine Hotel, St. Andrews, or at the office of the Engineer and Architect to the Royal National Lifeboat Institution, Mr. W. T. Douglass M.Inst.C.E., 15, Victoria-street, Westminster, London, S.W. Copies of the bills of quantities and form of tender may be obtained on application to the Engineer and Architect, accompanied by a deposit of 1*l*., who will also supply copies of certain of the plans at a cost of 2s. (non-returnable).

* OCTOBER 4.—**London.**—SOLDIERS' QUARTERS.—The Secretary of State for War invites tenders for two warrant officers' quarters and three "A" and six "C" married soldiers' quarters (in flats) at Wellington Barracks. See advertisement in this issue for further particulars.

OCTOBER 6.—**Middleton.**—SECONDARY SCHOOL.—The Middleton Education Committee invite tenders for the erection of a secondary school in Rectory-street, Middleton. Plans may be seen, and bills of quantities obtained, at the office of the County Architect, Mr. Henry Littler, 6, Ribblesdale-place, Preston, by payment of a deposit of 3*l*.

* OCTOBER 11.—**Manchester.**—SCHOOL.—The Manchester Education Committee invite tenders for erection of the Brookdale Park Municipal School, Newton Heath, Manchester. See advertisement in this issue for further particulars.

NOVEMBER 9. — **Antwerp.** — DRY DOCK. — The College des Bourgmestre et Echevins invite tenders for the construction of a dry dock and quay wall at Quai Est (No. 61) of the Lefebvre Basin. Estimate, 4,361,000 francs. Deposit, 500,000 francs. Plans and specifications can be seen at Room 4 and at the Secretary's Office, Hotel de Ville. Price of specification, 5 francs.

NO DATE.—**Ballyholme, Co. Down.**—VILLAS.—Tenders are invited for the erection of two semi-detached villas, Ballyholme, Bangor, County Down, for Mrs. John Byrne. Particulars of the work can be obtained at the offices of Messrs. Moore & Flanigan, architects, 35, Royal-avenue, Belfast.

BUILDING—*continued.*

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NO DATE.—**Clones.**—LICENSED PREMISES.—Tenders are invited for the rebuilding of licensed premises, Fermanagh-street, Clones, for Mr. P. Murphy. Plans, etc., may be obtained at the offices of Mr. J. V. Brennan, C.E., architect, Belfast Bank-chambers, Belfast.

NO DATE.—**Harton.**—ALTERATIONS, ETC.—Tenders are invited for alterations and additions to the Harton branch of the Boldon Co-operative Society, Ltd. Quantities and particulars may be obtained on application to Mr. Charles W. Bell, architect, 17, Norfolk-street, Sunderland.

NO DATE.—**Hitchin.**—HOUSES.—Tenders are invited for the erection of a pair of semi-detached houses in Fishpond-road, Bearton Fields Estate. Plans, etc., can be seen by appointment with Mr. A. Fowler, The Lodge, Hitchin.

NO DATE.—**Kessingland.**—SCHOOL IMPROVEMENTS.—For the erection of certain alterations and additions to schools at Kessingland. Names to Mr. W. J. Roberts, architect, Lowestoft.

NO DATE.—**Meir.**—RESIDENCES.—For the erection of two residences in Weston-road, Meir. Names to Mr. W. A. Baynes, architect, Fountain-chambers, Hanley.

NO DATE.—**Swansea.**—PREMISES.—Tenders are invited for the erection of new premises, 19, Castle-street, Swansea, for Messrs. Masters & Co. Copies of the bills of quantities can be obtained from Mr. E. C. Morgan Wilmott, A.R.I.B.A., architect, 69, Mansel-terrace, Swansea, upon receipt of a deposit of 2*l.* 2*s.*

NO DATE.—**Truro.**—FERRO-CONCRETE WAREHOUSE.—For the construction of ferro-concrete warehouse at Malpas-road, Truro. Names to the Western Counties Agricultural Co-operative Association, Ltd., Millbay-road, Plymouth.

NO DATE.—**Witcombe.**—SCHOOL IMPROVEMENT.—Alterations and additions at Witcombe School, for Mr. W. F. Hicks-Beach. Particulars may be obtained from Mr. R. S. Phillips, architect, Gloucester.

ENGINEERING, IRON, AND STEEL.

SEPTEMBER 20.—**Monaghan.**—RAILWAY COAL STORE.—The Directors of the Great Northern Railway Company (Ireland) invite tenders for the construction and erection of a coal store at their Monaghan Station, with corrugated-iron roof, sides, etc., and steel framing and wooden roof principals. Drawings and specification may be seen at the office of Mr. W. H. Mills, Engineer in-Chief, Amiens-street Terminus, Dublin, or copies of them at the office of the District Engineer, Belfast, and forms of tender can be obtained at these offices on payment of 1*s.* each (not returnable).

SEPTEMBER 20.—**Salford.**—TRAMWAY RAILS.—Salford Tramways Committee invite tenders for the supply and delivery of 500 tons of steel tramway rails. Specification, etc., may be obtained from the General Manager, 32, Blackfriars-street, Salford.

SEPTEMBER 21.—**London.**—METALS.—The Directors of the Bombay, Baroda, and Central India Railway invite tenders for the supply of metals. Specification, etc., can be obtained on payment of 1*l.* 1*s.* each (which will not be returned) from Mr. C. Grommelin, Secretary, Gloucester House, 2, 3, and 4, Bishopsgate-street Without, London, E.C.

SEPTEMBER 21.—**Manchester.**—TRAMWAY RAILS.—The Tramways Committee of the Manchester Corporation invite tenders for the supply and delivery of steel girder tramway rails. Specifications and forms of tender may be obtained on application to Mr. J. M. M'Elroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester, on deposit of 1*l.* 1*s.*

OCTOBER 4.—**Glasgow.**—LIFTS.—Glasgow Corporation invite offers for supplying and fitting up the following lifts required for the new Mitchell Library at North-street, viz.:—(1) One electric passenger lift; (2) three electric book lifts; and (3) three hand book lifts. Specifications and forms of tender may be had on application at the office of Mr. W. B. Whitie, 219, St. Vincent-street.

MISCELLANEOUS.

SEPTEMBER 20.—**Alnwick.**—CATTLE PENS.—The Alnwick U.D.C. invite tenders for construction of twenty-two additional store cattle pens, in creosoted timber, in the Cattle Market at Wagon Way. Plans, etc., to be seen at U.D.C. Offices, Green Batt. Mr. Geoffrey Wilson, Town Surveyor.

SEPTEMBER 21.—**Rhondda.**—SCAVENGING CARTS.—Rhondda U.D.C. invite tenders for supplying and delivering eight scavenging carts. Particulars can be obtained from Mr. W. J. Jones, Engineer and Surveyor, Council Offices, Pentre.

SEPTEMBER 21.—**Scunthorpe.**—ADIT.—The Scunthorpe U.D.C. invite tenders for driving an adit at the Risby Waterworks, together with certain other small works. Particulars to be seen at the office of Mr. C. Curtis Gray, Engineer and Surveyor to the Council, Home-street, Scunthorpe.

SEPTEMBER 23.—**Manchester.**—CARTAGE.—The Manchester Corporation Gas Committee invite tenders for the carting of coke. General conditions of contract and form of tender may be obtained on application (in writing only) to Mr. C. Nickson, Superintendent, Gas Department, Town Hall, Manchester.

SEPTEMBER 23.—**Reading.**—DEMOLITION.—Berkshire C.C. invite tenders for the demolition and removal of the existing premises, Nos. 26, 28, and 30, The Forbury, Reading. Particulars and form of tender may be obtained from Mr. J. F. Hawkins, County Surveyor, Bank-chambers, Cross-street, Reading.

SEPTEMBER 27.—**Belfast.**—ELECTRIC LIGHTING.—The Committee of Management of Belfast District Asylum invite tenders for electric lighting installations in new asylum buildings on the Purdysburn Estate. Specifications can be obtained, and drawings seen, at the offices of Messrs. Watt, Tulloch, & Fitzsimons, 77A, Victoria-street, Belfast, on payment of 10*s.*

SEPTEMBER 27.—**Selkirk.**—SKATING-RINK FLOOR.—Offers are wanted for relaying floor of Victoria Hall, Selkirk, with maple wood, suitable for purposes of roller skating. Floor measurement, 387 sq. yds. Specifications are in the hands of Mr. John Pollok, Town Clerk, Selkirk.

SEPTEMBER 27.—**Stepney.**—REMOVAL OF OLD MATERIAL.—The Stepney B.C. invite tenders for the removal of old tins, galvanised buckets, baths, and other similar waste material from the Council's depôts, wharves, and other premises. Further information may be obtained upon application to the Borough Engineer, Mr. M. W. Jameson, A.M.Inst.C.E., at No. 15, Great Alie-street, Whitechapel, E., between 11 a.m. and 12 noon.

★ SEPTEMBER 28.—**London, E.**—PLASTERING.—The Managers of the Poplar and Stepney Sick Asylum District invite tenders for certain plastering work in the "G and H" Ward at the Sick Asylum, Devons-road, Bromley-by-Bow, E. See advertisement in this issue for further particulars.

SEPTEMBER 28.—**Woodford.**—STEAM ROLLING AND SCARIFYING.—Woodford U.D.C. invite tenders for the hire of steam rollers and scarifying. Particulars and forms of tender may be obtained from Mr. William Farrington, Surveyor to the Council, Council Offices, Woodford Green.

OCTOBER 1.—**Govan.**—BLINDS.—The Govan Combination P.C. invite tenders for window blinds at new Poorhouse block and in Governor's and Doctor's houses, Merryflatts, Govan. Specification and schedule can be obtained at the office of the architects, Messrs. Thomson & Sandilands, 4, Jane-street, Blythswood-square.

OCTOBER 1.—**Maidstone.**—DISINFECTANTS.—The Maidstone B.C. invite tenders for the supply of disinfectants. Forms of tender and all information can be obtained from the Sanitary Inspector, Health Department, Fair Meadow, Maidstone.

OCTOBER 9.—**Shropshire.**—DREDGING.—Tenders are invited for cleaning, deepening, widening, and diverting a portion of the River Rea, Asterley and Minsterley Brooks. Plans and specifications may be inspected at the office of Messrs. T. Hickman & Son, Pride-hill-chambers, Shrewsbury, or copies may be obtained upon payment of a deposit of 2*l.* 2*s.*

OCTOBER 14.—**London.**—MILD STEEL GALVANISED SHEETS, ETC.—The Egyptian War Department invite tenders for very mild steel galvanised sheets and brass and iron buckles and rings. Particulars from Lieut.-Col. Western, Queen Anne's-chambers, Westminster.

PAINTING, etc.

SEPTEMBER 20.—**Horncastle.**—PAINTING.—Horncastle Guardians invite tenders for painting at the Workhouse and the Isolation Hospital. Particulars may be obtained on application to the Master of the Workhouse.

SEPTEMBER 20.—**Mountain Ash.**—PAINTING AND GRAINING.—Tenders are invited for the painting and graining of about 300 houses in and near Mountain Ash. Specification and all other particulars may be obtained on application to Mr. G. A. Evans, incorporated accountant, Mountain Ash.

SEPTEMBER 21.—**Cheltenham.**—PAINTING.—The Gloucester Co-operative and Industrial Society, Ltd., invite tenders for painting, etc., at their branch, Nos. 238 and 238A, High-street, Cheltenham. Specifications can be seen at the offices of the society in Gloucester and Cheltenham during office hours.

SEPTEMBER 23.—**Cardiff.**—PAINTING.—The Corporation of Cardiff invite tenders for painting the Clarence Bridge (over the River Taff). Specification may be seen, and forms of tender obtained, on application at the office of the City Engineer, Mr. W. Harpur, M.Inst.C.E., City Hall, Cardiff.

SEPTEMBER 24.—**Derby.**—PAINTING, ETC.—The Visiting Committee of the Derby County Asylum invite tenders for the painting and decorating of three wards, and distempering and limewashing. Specifications may be obtained from Mr. A. McWilliams, Resident Engineer.

SEPTEMBER 27.—**Lancaster.**—PAINTING.—The Visiting Committee of the County Lunatic Asylum, Lancaster, invite tenders for the exterior painting of certain portions of the Asylum. Forms of tender and full particulars may be obtained on application to Mr. J. R. Wilson, Clerk and Steward, Clerk's Office.

NO DATE.—**East Murton.**—DISTEMPERING AND VARNISHING.—Tenders invited for the distempering of walls and varnishing of woodwork of the interior of East Murton St. Joseph's R.C. School. Official forms and particulars may be obtained on application to Rev. Jos. W. Campbell, Easington, Castle Eden, S.O.

NO DATE.—**Fenton.**—PAINTING.—The Fenton U.D.C. invite tenders for painters' work required to be done at the Fenton Town Hall. Names to Mr. S. A. Goodall, Surveyor to the Council, Town Hall, Fenton.

NO DATE.—**Stalybridge.**—PAINTING.—The Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board invite tenders for painting all wood and ironwork outside the General Offices, Waterloo-road, Stalybridge. Full particulars may be obtained on application at the offices of Mr. Frank Schofield, Commercial Manager, General Offices, Waterloo-road, Stalybridge.

ROADS, SANITARY, AND WATER WORKS.

SEPTEMBER 20.—**Leeds.**—PAVING AND FLAGGING, ETC.—The Highways Committee invite tenders for the paving and flagging of Headingley-avenue, Canterbury-drive, and Winston-gardens; also for the re kerbing, rechannelling, and pitching of the improvement in Otley-road. Drawings may be seen at the City Engineer's Office, Municipal Buildings, and forms of tender, etc., may be obtained on application at the Highways Office, 155, Kirkstall-road, Leeds.

SEPTEMBER 20.—**Manchester.**—ROAD WORKS.—The Paving, Sewering, and Highways Committee of the Manchester Corporation invite tenders for the sewering, excavating, forming, ballasting, cindering, and fencing of Charlestown-road Extension, Blackley. Forms of tender may be obtained on application to the Paving, etc., Department (Surveyors' Office), Town Hall, Manchester.

SEPTEMBER 20.—**Windsor.**—PRIVATE STREET WORKS.—The Windsor R.D.C. invite separate tenders for making-up Rays-avenue, Jutland-lane, Forest-lane, St. Leonard's-place, Albert-place, and Rose's-lane, situate in the Parish of Clewer. Plans and specifications may be seen at the office of Mr. J. E. Gale, Clerk, 3, Sheet-street, Windsor, during office hours.

SEPTEMBER 21.—**Amble.**—PRIVATE STREET WORKS.—The Amble U.D.C. invite tenders for making-up Wellwood Back-lane West and approach to Northumbria-terrace. Plans, etc., can be seen at the office of Mr. Wm. Gibson, Surveyor, Council Offices, Queen-street, Amble.

SEPTEMBER 21.—**North Shields.**—STREET WORKS.—Tenders are invited for excavating, laying a rubble foundation, and tar macadam in Blanchland-terrace, and for channelling in Preston-avenue, North Shields. Plan, etc., may be seen at the office of Mr. John F. Smillie, Borough Surveyor.

SEPTEMBER 21.—**Salford.**—PAVING, ETC.—Tenders are invited for paving and completing certain streets. The plans may be seen, and forms of tender, with quantities, obtained, at the Borough Engineer's Office, Town Hall, Salford.

SEPTEMBER 23.—**Ilchester.**—SEWAGE DISPOSAL.—Yeovil R.D.C. invite tenders for providing and laying sewer and (provisionally) for the construction of a small sewage tank and filters in the Parish of Ilchester. Drawings and specification may be seen at the office of Mr. J. E. Rodber, Clerk, 30, Kingston, Yeovil, where a copy of the bill of quantities may be obtained on deposit of 1*l.*

SEPTEMBER 24.—**Edinburgh.**—PAVING.—The Edinburgh Corporation (Roads Department) invite estimates for whinstone sett paving in the carriageway of Millar-place. Plan may be seen, and schedules of quantities, etc., obtained, on application to the City Road Surveyor, City Chambers, Edinburgh.

SEPTEMBER 27.—**Dagenham.**—DRAIN CONNEXIONS.—The Romford R.D.C. invite tenders for the construction of drain connexions to the sewers in the Parish of Dagenham. Specification may be seen, and form of tender obtained, upon application to the surveyor, Mr. W. J. Grant, Victoria-chambers, Romford.

SEPTEMBER 27.—**Wantage.**—STEAM ROLLING AND SCARIFYING.—The Highways Committee of the Wantage U.D.C. invite tenders for the steam rolling and scarifying required in their district. Further particulars may be obtained from Mr. W. Hanson, Surveyor, Town Hall, Wantage.

★ SEPTEMBER 28.—**Neasden.**—ROAD-MAKING.—The Willesden D.C. invite tenders for certain road-making and paving works in Prout-grove, Neasden. See advertisement in this issue for further particulars.

SEPTEMBER 28.—**Sowerby Bridge.**—STREET WORKS.—Sowerby Bridge U.D.C. invite tenders for labour required in making-up Upper Fountain-street, etc. Forms of tender, quantities, and full particulars may be obtained on application to Mr. George E. Wrigley, Engineer's Office, Sowerby Bridge.

★ SEPTEMBER 28.—**Willesden.**—DRAINAGE.—The Willesden D.C. invite tenders for constructing drainage intercepting sewer. See advertisement in this issue for further particulars.

SEPTEMBER 30.—**Camborne.**—RESERVOIR.—The Camborne Water Company invite tenders for the construction of an open service reservoir, 1,000,000 gallons capacity; a water tower, 20,000 gallons capacity; and sundry other works (Contract No. 4). Plans may be seen, and copies of the specification, etc., obtained, at the offices of the Company, Camborne, between 10 a.m. and 4 p.m. on deposit of 3*l.* 3*s.* Mr. John Champion, Secretary, Camborne.

SEPTEMBER 30.—**Leamington Spa.**—ROAD WORKS.—The Corporation of Royal Leamington Spa invite tenders for making extensions to two roads. Plans and specification may be seen at the office of their Engineer at the Town Hall.

OCTOBER 2.—**Sandwich.**—WATER MAINS.—Eastry R.D.C. invite tenders for laying water mains from the boundary of the Borough of Sandwich to the Hamlet of Richborough. Specifications can be obtained from, and a plan of route seen at the office of Mr. Fred. S. Cloke, Clerk to the Council, Salisbury House, Strand-street, Sandwich.

OCTOBER 2.—**Swinton.**—EFFLUENT TANK.—The Swinton and Pendlebury U.D.C. invite tenders for the construction of an effluent tank at Swinton Sewage Works. Plans may be seen, and forms of tender obtained, on application to Mr. Henry Entwisle, Council Offices, Swinton.

OCTOBER 4.—**Castleford.**—FERRO-CONCRETE LINING TO RESERVOIR.—The Castleford U.D.C. invite tenders for the construction of a ferro-concrete lining for their reservoir at Redhill. Names, accompanied by a cheque deposit of 5*l.*, to the engineers, Messrs. D. Balfour & Son, 3, St. Nicholas-buildings Newcastle-on-Tyne, not later than September 18.

OCTOBER 4.—**Salisbury.**—PRIVATE STREET WORKS.—The T.C. invite tenders for executing certain works in Campbell-road. Plans, etc., may be seen, and bill of quantities with form of tender obtained, on application to Mr. W. J. Goodwin, A.M.Inst.C.E., City Engineer and Surveyor, Municipal Offices, Salisbury.

OCTOBER 5.—**Aldershot.**—MAKING-UP.—The Aldershot Council invite tenders for the making-up of Eland-road. Plans and specifications may be seen, and full particulars obtained, on application to Mr. Fred. C. Uren, A.M.Inst.C.E., Surveyor to the Council, Municipal Buildings, Aldershot.

OCTOBER 6.—**St. Nicholas-at-Wade.**—WATER MAIN.—Isle of Thanet R.D.C. invite tenders for providing and laying a water main (with fittings) from near Monkton Church to and through the Village of St. Nicholas-at-Wade, according to plans and specifications which may be seen at the office of the Surveyor at Birchington.

OCTOBER 7.—**Heston and Isleworth.**—PRIVATE STREET WORKS.—The U.D.C. of Heston and Isleworth invite tenders for the making-up of Albert-road, Hartham-road, Highfield-road, Newton-road, Percy-road, St. Mary's-crescent. Plans, etc., may be seen,

ROADS, etc.—*continued.*

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

and bills of quantities and form of tender obtained from Mr. J. G. Carey, Engineer and Surveyor to the Council, Council House, Hounslow, on payment of the sum of 1*l.* 1s.

No Date.—**London.**—Paving.—Tenders are invited for the relaying of about 1,900 ft. run of 7-ft. 6-in. stone paving along Crawford-avenue and Copland-avenue, upon the Harrowdene Estate. For specification and form of tender apply to Messrs. Walton & Lee, surveyors, 10, Mount-street, W.

No Date.—**Southampton.**—Road-making.—Tenders are required for road-making and drainage works for the development of "Clarence Lodge" Building Estate, High-street, Shirley, Southampton. Quantities and other particulars can be obtained on payment of 2s. 6d. (not returnable) on application to Mr. W. Burrough Hill, surveyor, 81, Above Bar, Southampton.

STONES, MATERIAL, AND STORES.

September 21.—**Cowes.**—Portland Cement.—The Cowes U.D.C. invite tenders for the supply of Portland cement. Form of tender may be obtained upon application to Mr. John W. Webster, Surveyor and Water Engineer to the Council.

September 21.—**Glasgow.**—Materials.—The Corporation invite tenders for supplying the materials to the Gas Department. Specifications and forms of tender may be obtained, and samples examined, on application to Mr. Alex. Wilson, Gas Engineer, 45, John-street, Glasgow.

September 23.—**Hatton.**—Building Materials.—The Committee of Visitors of the Warwick County Lunatic Asylum, Hatton, near Warwick, invite tenders for the supply of building materials. Forms of tender may be obtained, and samples of materials used can be seen, at the Asylum.

September 23.—**Preston.**—Stores.—Tenders are invited for the supply of stores to the County Asylum, Whittingham, Preston. Forms of tender, with particulars of quantities, etc., may be obtained from Mr. Thomas Dilworth, Clerk and Steward.

September 28.—**Sowerby Bridge.**—Road Materials.—The Sowerby Bridge U.D.C. invite tenders for setts, flags, and kerbs required in making-up Upper Fountain-street, etc. Forms of tender and full particulars may be obtained on application to Mr. George E. Wrigley, Engineer's Office, Sowerby Bridge.

September 28.—**Woodford.**—Broken Granite.—The Woodford U.D.C. invite tenders for the supply of broken granite. Particulars and forms of tenders may be obtained from Mr. William Farrington, Surveyor to the Council, Council Offices, Woodford Green.

September 30.—**Bideford.**—Broken Granite and Granite Kerb.—The Corporation of Bideford invite tenders for the supply of broken granite and granite chippings. Forms of tender and further particulars can be obtained on application to Mr. W. B. Seldon, Town Clerk.

October 2.—**Kesteven.**—Granite, Gravel, etc.—The Highways Committee of the Kesteven C.C. invite tenders for the supply of granite, slag dust, and gravel. Forms of tender can be obtained from Mr. W. B. Purser, County Surveyor's office, Grantham.

October 2.—**Lymington.**—Granite, etc.—Lymington T.C. invite tenders for the supply and delivery of about 220 tons of granite or basalt, broken to 2-in. gauge, and about 25 tons of granite chippings, broken to ¾-in. gauge. Tenders for steam rolling and scarifying (particulars of which can be obtained upon application to the Borough Surveyor) are also invited. Mr. J. Davis Rawlins, Town Clerk, Town Clerk's office, Lymington, Hants.

* October 4.—**London.**—General Stores.—The Directors of the Metropolitan Railway Company invite tenders for the supply of general stores during twelve months. See advertisement in this issue for further particulars.

October 11.—**Todmorden.**—Granite Setts.—Todmorden B.C. invite tenders for the supply and delivery of about 3,000 tons of granite setts. Specification and form of tender may be obtained on application to Mr. J. A. Heap, Borough Engineer,

* October 12.—**London.**—Gravel.—The London C.C. invite tenders for supply of fine binding gravel at various parks, gardens, and open spaces. See advertisement in this issue for further particulars.

No Date.—**Croston.**—Granite Macadam.—The Croston U.D.C. invite tenders for the supply of 260 tons of 2½-in. Welsh granite macadam, for road-making purposes. Mr. T. Whittle, Council Offices, Croston.

Public Appointment.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
•INSTRS. IN WORKSHOP DRAWING AND CALCULATIONS	London C.C.	See advertisement in this issue	Sept. 24

Auction Sales.

Nature and Place of Sale.	By whom Offered.	Date of Sale.
•BUILDING MATERIALS AND FITTINGS OF MANSION, STREATHAM—On the Premises	Hooker & Webb	Sept. 20
•FREEHOLD SHOP, ISLINGTON—At the Mart	T. B. Westacott	Sept. 23
•SLATE TILE AND BRS' MERCHANTS' STOCK, FINSBURY PARK, N.—On the Premises	H. W. Smith	do.
•DEALS, BATTENS, ETC.—Great Hall, Winchester House, Old Broad-street, E.C.	Churchill & Sims	Sept. 29
•FREEHOLD BUILDING SITE, DALSTON—At the Mart	W. Stevens	Sept. 30
•FREEHOLD HOUSE, ETC., FRIERN, BARNET—Railway Hotel, New Southgate	Chas. Sparrow & Son	Oct. 4
•FREEHOLD BUILDING LAND, EWELL, SURREY—At the Mart	Robt W. Fuller, Moon, & Fuller	do.
•FREEHOLD BUILDING SITES, ETC., SURREY—At the Mart	Breadmore & Webb	Oct. 5

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Best Stocks	1 6 6	per 1000 alongside, in river.
Picked Stocks for Facings	2 10 0	"
Flettons	1 4 6	" delivered at railway depôt,
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire	3 15 0	" " "
Do. Bullnose	4 0 0	" " "
Best Stourbridge Fire Bricks	3 14 0	" " "
Glazed Bricks.		
Best White and Ivory Glazed Stretchers	10 7 6	" " "
Headers	9 17 6	" " "
Quoins, Bullnose, and Flats	13 17 6	" " "
Double Stretchers	15 17 6	" " "
Double Headers	12 17 6	" " "
One Side and two Ends	16 17 6	" " "
Two Sides and one End	17 17 6	" " "
Splays and Squints	15 7 6	" " "
Best Dipped Salt Glazed Stretchers	10 7 6	" " "
Headers	9 17 6	" " "
Quoins, Bullnose, and Flats	13 17 6	" " "
Double Stretchers	15 17 6	" " "
Double Headers	12 17 6	" " "
One Side and two Ends	16 17 6	" " "
Two Sides and one End	17 17 6	" " "
Splays and Squints	15 7 6	" " "
Second Quality White and Dipped Salt Glazed	1 5 0	" less than best.

	s. d.	
Thames and Pit Sand	6 6	per yard, delivered.
Thames Ballast	5 0	"
Best Portland Cement	28 0	per ton, "
Best Ground Blue Lias Lime	19 0	" "

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s. 6d. per yard, delivered.
Stourbridge Fireclay in sacks 27s. 0d. per ton at rly. dpt.

STONE.

	s. d.	
Bath Stone—delivered on road waggons, Paddington Depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "
Portland Stone (20 ft. average)—Brown Whitbed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2 2½	" "
Ancaster in blocks	1 10	per ft. cube deld. rly. dep.
Beer "	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 2	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

York Stone—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. dep.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per ft. super. "
6 in. rubbed two sides ditto, ditto	2 6	" "
3 in. sawn two sides slabs (random sizes)	0 11½	" "
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Hard York—		
Scappled random blocks	3 0	per ft. cube, "
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 8	per ft. super. "
6 in. rubbed two sides ditto	3 0	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "

SLATES.

In. In.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at r.d.
20×12 " "	13 17 6	" "
20×10 first quality "	13 0 0	" "
20×12 " "	13 15 0	" "
16×8 " "	7 5 0	" "
22×10 best blue Portmadoc	12 12 6	" "
16×8 " "	6 12 6	" "
20×10 best Eureka unfading green	15 17 6	" "
20×12 " "	18 7 6	" "

SLATES (*continued*).

In. In.	£ s. d.	
18×10 best Eureka unfading green	13 5 0	per 1000 of 1200 at r.d.
16×8 " "	10 5 0	" "
20×10 permanent green	11 12 6	" "
18×10 " "	9 12 6	" "
16×8 " "	6 12 6	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1000 at rly. dep.
Hip and Valley tiles	3 7	per doz. "
Best Broseley tiles	50 0	per 1000 "
Do. Ornamental tiles	52 6	" "
Hip and Valley tiles	4 0	per doz. "
Best Ruabon red, brown, or brindled do. (Edwards)	57 6	per 1000 "
Do. Ornamental do.	60 0	" "
Hip tiles	4 0	per doz. "
Valley tiles	3 0	" "
Best Red or Mottled Staffordshire do. (Peakes)	51 9	per 1000 "
Do. Ornamental do.	54 6	" "
Hip tiles	4 1	per doz. "
Valley tiles	3 8	" "
Best "Rosemary" brand plain tiles	48 0	per 1000 "
Best Ornamental tiles	50 0	" "
Hip tiles	4 0	per doz. "
Valley tiles	3 8	" "
Best "Hartshill" brand plain tiles, sand-faced	50 0	per 1000 "
Do. pressed	47 6	" "
Do. Ornamental do.	50 0	" "
Hip tiles	4 0	per doz. "
Valley tiles	3 6	" "
Staffordshire (Hanley) Reds or Brindled tiles	42 6	per 1000 "
Hand-made sand-faced	45 0	" "
Hip tiles	4 0	per doz. "
Valley tiles	3 6	" "

WOOD.

Building Wood.	At per standard. £ s. d.	£ s. d.	
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	13 10 0	15 0 0	
Deals: best 3 by 9	13 0 0	14 0 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 0 0	12 0 0	
Battens: best 2½ by 6 and 3 by 6	0 10 0		less than 7 in. and 8 in.
Deals: seconds	1 0 0		less than best.
Battens: seconds	0 10 0		"
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	10 0 0	
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0	
Foreign Sawn Boards—			
1 in. and 1¼ in. by 7 in.	0 10 0		more than battens.
¾ in.	1 0 0		"

WOOD (*continued*).

BUILDING WOOD—(*continued*)—	At per load of 50 ft. £ s. d.			£ s. d.		
Fir timber: best middling Danzig or Memel (average specification)	4	10	0	5	0	0
Seconds	4	0	0	4	10	0
Small timber (8 in. to 10 in.)	3	12	6	3	15	0
Small timber (6 in. to 8 in.)	3	0	0	3	10	0
Swedish balks	2	10	0	3	0	0
Pitch-pine timber (30 ft. average)	4	0	0	4	15	0

JOINERS' WOOD.	At per standard.					
White Sea: first yellow deals, 3 in. by 11 in.	24	0	0	25	0	0
3 in. by 9 in.	22	0	0	23	0	0
Battens 2½ in. and 3 in. by 7 in.	16	10	0	18	0	0
Second yellow deals, 3 in. by 11 in.	18	10	0	20	0	0
3 in. by 9 in.	17	10	0	19	0	0
Battens, 2½ in. and 3 in. by 7 in.	13	10	0	14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	13	10	0	15	0	0
Battens, 2½ in. and 3 in. by 7 in.	11	0	0	12	0	0
Petersburg: first yellow deals, 3 in. by 11 in.	21	0	0	22	10	0
Do. 3 in. by 9 in.	18	0	0	19	10	0
Battens	13	10	0	15	0	0
Second yellow deals, 3 in. by 11 in.	16	0	0	17	0	0
Do. 3 in. by 9 in.	14	10	0	16	0	0
Battens	11	0	0	12	10	0
Third yellow deals, 3 in. by 11 in.	13	0	0	14	0	0
Do. 3 in. by 9 in.	12	10	0	14	0	0
Battens	10	0	0	11	0	0
White Sea and Petersburg— First white deals, 3 in. by 11 in.	14	10	0	15	10	0
" " 3 in. by 9 in.	13	10	0	14	0	0
Battens	11	0	0	12	0	0
Second white deals, 3 in. by 11 in.	13	10	0	14	10	0
" " 3 in. by 9 in.	12	10	0	13	10	0
Battens	10	0	0	11	0	0
Pitch-pine: deals	18	0	0	21	0	0
Under 2 in. thick extra	0	10	0	1	0	0
Yellow pine—First, regular sizes	44	0	0	upwards.		
Oddments	32	0	0	"		
Seconds, regular sizes	33	0	0	"		
Oddments	28	0	0	"		
Kauri Pine Planks, per ft. cube	0	3	6	0	5	0
Danzig and Stettin Oak logs— Large, per ft. cube	0	3	0	0	3	9
Small " "	0	2	6	0	2	6
Wainscot Oak Logs, per ft. cube	0	5	6	0	6	0
Dry Wainscot Oak, per ft. sup. as inch	0	0	8½	0	0	9½
¼ in. do. do	0	0	7	—		
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch	0	0	9	0	1	0
Selected, Figury, per ft. super. as inch	0	1	6	0	2	6
Dry Walnut, American, per ft. super. as inch	0	0	10	0	1	0
Teak per load	17	0	0	22	0	0
American Whitewood Planks, per ft. cube	0	4	0	0	5	0

Prepared Flooring, etc.—	Per square.					
1 in. by 7 in. yellow, planed and shot	0	13	6	0	17	0
1 in. by 7 in. yellow, planed and matched	0	14	0	0	18	0
1¼ in. by 7 in. yellow, planed and matched	0	16	0	1	0	0
1 in. by 7 in. white, planed and shot	0	12	0	0	14	6
1 in. by 7 in. white, planed and matched	0	12	6	0	15	0
1¼ in. by 7 in. white, planed and matched	0	15	0	0	16	6
¼ in. by 7 in. yellow matched and beaded or V-jointed brds.	0	11	0	0	13	6
1 in. by 7 in. " "	0	14	0	0	18	0
¼ in. by 7 in. white " "	0	10	0	0	11	6
1 in. by 7 in. " "	0	12	9	0	15	0

6 in. at 6d. to 9d. per square less than 7 in

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.			£ s. d.		
Rolled Steel Joists, ordinary sections	7	0	0	7	10	0
Compound Girders, ordinary sections	9	0	0	10	0	0
Steel Compound Stanchions	11	0	0	12	0	0
Angles, Tees, and Channels, ordinary sections	9	0	0	10	0	0
Flitch Plates	9	0	0	9	10	0
Cast Iron Columns and Stanchions including ordinary patterns	7	10	0	8	10	0

METALS.

IRON—	Per ton, in London. £ s. d.			£ s. d.		
Common Bars	8	10	0	9	0	0
Staffordshire Crown Bars, good merchant quality	8	15	0	9	5	0
Staffordshire "Marked Bars"	10	10	0	—		
Mild Steel Bars	8	15	0	9	5	0
Hoop Iron, basis price	9	5	0	9	10	0
" " Galvanised	17	0	0	—		

(*And upwards, according to size and gauge.)

Sheet Iron, Black—						
Ordinary sizes to 20 g.	9	15	0	—		
" " 24 g.	10	15	0	—		
" " 26 g.	12	5	0	—		
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	15	0	0	—		
Ordinary sizes to 22 g. and 24 g.	15	10	0	—		
" " 26 g.	1.	10	0	—		
Sheet Iron, Galvanised, flat, best quality— Ordinary sizes to 20 g.	18	0	0	—		
" " 22 g. and 24 g.	18	10	0	—		
" " 26 g.	20	0	0	—		
Galvanised Corrugated Sheets— Ordinary sizes, 6 ft. to 8 ft. 20 g.	14	10	0	—		
" " 22 g. and 24 g.	14	15	0	—		
" " 26 g.	16	5	0	—		
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. to 20 g. and thicker	12	0	0	—		
Best Soft Steel Sheets, 22 g. & 24 g.	13	0	0	—		
" " 26 g.	15	0	0	—		
Cut Nails, 3 in. to 6 in.	10	10	0	11	0	0

(Under 3 in., usual trade extras.)

LEAD, &c. Per ton in London.

	£ s. d.			
LEAD—Sheet, English, 3lb. and up.	16	2	6	—
Pipe in coils	16	12	6	—
Soil pipe	18	12	6	—
Compo pipe	19	12	6	—
ZINC—Sheet— Vielle Montagne	27	5	0	—
Silesian	27	0	0	—
COPPER— Strong sheet per lb.	0	1	0	—
Thin "	0	1	1	—
Copper nails "	0	0	10	—
Copper wire "	0	0	10	—
BRASS— Strong Sheet "	0	0	11	—
Thin "	0	1	0	—
TIN—English Ingots "	0	1	5	—
SOLDER—Plumbers' "	0	0	7	—
Tinmen's "	0	0	9½	—
Blowpipe "	0	1	0	—

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1½d. " "
21 oz. thirds	3d. " "
" fourths	2½d. " "
26 oz. thirds	4d. " "
" fourths	3d. " "
32 oz. thirds	4½d. " "
" fourths	4½d. " "
Flute Sheet, 15 oz	3½d. " "
" 21 oz.	4½d. " "

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

⅛ Hartley's	2½d. per ft. delivered.
3/16 "	2⅝d. " "
¼ "	2¾d. " "
Figured, Oxford Rolled and "Oceanic" Glass, white	3½d. " "
" " tinted	5d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 2 2
" " in barrels	"	0 2 3
" " in drums	"	0 2 6
Boiled " in barrels	"	0 2 6
" " in drums	"	0 2 9
Turpentine in barrels	"	0 3 5
" in drums	"	0 3 7
Genuine Ground English White Lead	per ton	20 10 0
Red Lead, Dry	"	20 0 0
Best Linseed Oil Putty	per cwt.	0 7 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c. Per gallon.

	£ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 6
Fine Elastic Carriage	0 12 0
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 10 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flating Varnish	0 18 0
White Pale Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 0
Berlin Black	0 16 0
Knotting	0 10 9
French and Brush Polish	0 10 6

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursday.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

*** Denotes *accepted.* † Denotes *provisionally accepted.***

ABERTYSSWG (Mon).—For erecting a cottage hospital, for Abertysswg Sick Fund Society. Mr. A. F. Webb, architect and surveyor, Blackwood and Tredegar. Quantities by architect:—

W. Williams	£2,245	W. Williams	£2,101
J. Lloyd	2,232	W. Cooper	2,100
Vodden & Lee	2,165	T. D. Wilkins	2,066
R. Blundell	2,135	S. Matthews, Flower*	2,037
H. Davies	2,120		

ALMONDSBURY.—For additions to Pilning Council School, for Gloucestershire Education Committee. Mr. R. S. Phillips, architect, Midland Bank-chambers, Gloucester:—

H. W. Harris	£2,305 4 8	E. Pruce	£1,730 0 0
S. Lovell	2 114 0 0	S. Slaughter	1,726 0 0
T. R. Lewis	1,956 0 0	E. Clark & Sons	1,720 0 0
J. Browning	1,850 0 0	E. Love	1,705 0 0
T. Lovell & Sons	1,813 0 0	Walters & Son	1,631 0 0
J. Perkins & Sons, Ltd.	1,740 10 0	Orchard & Peer	1,579 0 0
C. A. Hayes & Son	1,735 0 0	W. T. Nicholls	1,564 0 0
Stephens, Bastow, & Co., Ltd.	1,735 0 0	Byard & Son	1,523 0 0
		Adams & Jefferies	1,458 0 0
		A. G. Heard, Bristol†	1,443 16 6

ALTRINCHAM.—For the construction of 9-in. 12-in. and 15-in. sewers in Regent-road and Oldfield-road, for the Urban District Council. Mr. H. E. Brown, Surveyor to the Council, Town Hall, Altrincham:—

	Oldfield-road.	Regent-road
T. Hindley	£491 13 0	£318 11 6
Executors of T. Barber	453 10 0	390 15 0
G. Bozon	390 0 0	490 0 0
J. Hamilton & Son	363 0 0	354 0 0
Edmundson & Wyatt	339 0 0	314 0 0
W. P. Meikle, 67, Dale-street, Liverpool*	319 10 10	288 0 7

BARROW-IN-FURNESS.—For erecting a wash-house and storeroom at the Cottage Homes, Roose-road, for the Guardians. Mr. H. T. Fowler, A.R.I.B.A., Cornwallis-street, Barrow-in-Furness:—

P. Robinson, Greengate, Barrow* £55

BURY.—For heating and ventilating at the new Municipal Secondary School:—

J. H. Higson, Manchester* {£534 15 0 (Scheme A). {£524 15 0 (Scheme B).

CALVERLEY.—For erecting a small house, for Mr. and Mrs. Barrons. Mr. H. E. Priestley, architect, 17, Bertram-road, Bradford. Quantities by architect:—

Excavator, Mason, and Bricklayer's Work: Hanson, Fairburn, & Sons, Wyke*	£227 0
Carpenter and Joiner's Work: H. T. Coates, Lily-street, Manningham*	89 8
Slater's Work: F. Thompson, Stanningley*	16 10
Plasterer's Work: J. E. Wheatley, Calverley*	24 10
Plumber and Glazier's Work: J. Jeffrey, Calverley*	44 7

CENTRY.—For laying of water mains, etc., for water supply of Centry, near Kingsbridge, for Mr. E. W. Adams. Mr. R. Hansford Worth, M.Inst.C.E., 42, George-street, Plymouth:—

T. Shaddock	£235 12 8	W. C. Shaddock	£196 15 10
A. G. Osenton	231 18 9	G. B. Andrews, Ivybridge, Devon*	171 10 4
R. C. Brebner & Co.	216 12 5	J. W. Mitchell	123 10 0
J. Small	214 9 11	T. H. Oliver	121 0 0
W. Stephens	209 19 10		
Hawking & Best	209 6 7		

[The cast-iron pipes, etc., supplied to the contractor.]

CHELMSFORD.—For additions to "Thornwoods," London-road, for Dr. J. L. Martin. Messrs. Charles & W. H. Pertwee, architects and surveyors, Chelmsford and London:—

W. Fincham	£150	Johnson & Hawkes, Chelmsford*	£144
J. I. Taylor	147		

CHELMSFORD.—For proposed house, Springfield, for Mr. P. H. Gray. Messrs. Charles & W. H. Pertwee, architects and surveyors, Chelmsford and London:—

W. Fincham	£2,221 15 8	H. Potter & Son	£1,895 0 0
Ghoat & Son	2,150 0 0	T. J. Bailey	1,872 0 0
J. Gowers	1,980 0 0	F. Weight, Chelmsford*	1,850 0 0
Johnson & Hawkes	1,977 0 0		

CHELMSFORD.—For alterations and additions, Cuton Hall, Springfield, for Mr. F. J. Marriage. Messrs. Charles & W. H. Pertwee, architects and surveyors, Chelmsford and London:—

W. Fincham	£739 0	T. J. Bailey	£694 17
J. Gowers	720 0	Baker & Sons, Danbury*	642 0
F. Weight	718 0		

EATON SOCON (St. Neots).—For alterations to The Chestnuts, Eaton Socon, for Mr. J. D. Higgin. Mr. T. Cockrill, A.M.Inst.C.E., architect, Market-place, Biggleswade:—

F. Wellham, Eaton Socon* £235

ECCLES.—For erecting a new secondary and technical school, Park-road, Monton, for the Education Committee. Mr. H. Littler, County Architect, 16, Ribblesdale-place, Preston:—

W. Nicholson & Son (Leeds), Ltd., Hunslet, Leeds* £12,500

GOWERTON.—For supplying, laying, jointing, and reinstating of ground of 1,000 yds. 6-in. and one mile of 3-in. cast-iron locket and spigot pipes, for the Directors of the Gowerton and District Gas Company, Ltd.:—

Parkinson & Hodgen, Nicholl-street, Swansea* £553 18 8

HOLMFIRTH.—For sewerage works, Hinchcliff Mill, Burnlee, and Woodhead-road sections, for the Urban District Council. Messrs. J. Barrowclough & Son, Engineers, Holmfirth. Quantities by Engineers:—

No. 1.—Boothroyd.
J. W. Almondbury, Huddersfield, on schedule.*

No. 2.—Hinchcliff.
Littlewood, Scholes, on schedule.*

ILKESTON.—For the erection of Elementary Council Schools, Hallcroft, Ilkeston for 680 scholars, for the Ilkeston Education Committee. Mr. H. Tatham Sudbury, M.S.A., architect, Estate Offices, Ilkeston. Quantities by Architect:—

F. Messom	£9,250 0 0
T. Barlow & Co.	7,878 0 0
F. Perks & Son, Ltd.	7,844 4 6
Bosworth & Lowe	7,615 18 0
W. V. Ireson	7,595 10 0
W. Maule & Co.	7,535 0 0
J. N. Beardsley	7,480 0 0
W. Donnelly & Sons	7,407 15 0
F. Martin	7,317 0 0
A. Earnshaw, Ilkeston*	7,290 0 0

[Architect's estimate, £7,453.]

Footroad on West Side of School.

A. Earnshaw* £60 0 0

KEIGHLEY.—For erecting shed and warehouse in West-lane. Messrs. J. Haggas & Sons, architects, North-street, Keighley:—

Mason: H. V. Robinson, Ltd., Keighley* ....
Joiner: W. Steel, Keighley* ....
Slater: W. Thornton, Bingley* ....
Plumber: W. & J. Harrison, Keighley* £6,500
Plasterer: A. Emmott, Keighley* ....
Iron and Steel: Roberts & Co., Ltd., Cutter Heights, Bradford* ....
Patent Glazing: W. H. Heywood & Co., Huddersfield* ....

LONDON.—For the erection of a new building upon the site of Nos. 258 to 262, Westminster Bridge-road, S.E., and site of hall at rear of No. 256, for Mr. Joseph Lyons. Messrs. Joseph & Smithem, architects, 83, Queen-street, Cheapside. Quantities by Mr. Chas. W. Latter:—

Simpson & Sons ..	£8,279	Colls & Sons	£7,712
C. Bovis & Co.	7,941	Holliday & Greenwood	7,698
Dove Bros.....	7,898	Holloway Bros.....	7,590
F. G. Minter	7,864	W. Downs	7,539
Higgs & Hill	7,864	Wallis & Sons	7,490
J. Carmichael	7,795		

LONDON.—For forming gallery, staircase, etc., at 429, Strand, for Messrs. Dunn & Co. Mr. E. A. Fermand, architect, 59, Denbigh-street, Westminster:—

Courtney, Pope, & Co.	£306	7	0
W. J. Negus	294	0	0
C. Spreckley & Co., Ltd.	281	17	10
S. Jones	250	5	0
Sims & Woods†	240	0	0

LONG EATON.—New streets, for the Bonsall Street Land Society. Mr. Walter H. Woods, M.S.I., architect and surveyor, High-street, Long Eaton, near Nottingham:—

J. Hutchinson & Son	£2,789	0	0
J. Hawley	2,446	15	6
Perks & Son ..	2,188	0	0
J. Bull	2,027	0	0
J. Thraves ..	£2,022	0	0
C. Cox & Co.	1,949	5	8
Brown & Son, Long Eaton*	1,919	10	0
Belshaw & Son	1,877	0	0

LYMINGTON.—For pumping plant at Ampress, for the Corporation:—

C. Isler & Co., Ltd.	£1,151	0	
Crossley Bros., Ltd.	1,145	0	
Shalders & Davis‖	1,090	0	
Ruston, Proctor, & Co., Lincoln*	998	0	
Duke & Ockenden	948	10	
Fielding & Platt	925	0	
A. C. Potter & Co	840	0	

MILLSHAW.—For alterations and additions to three cottages, Millshaw, Churwell, for W. L. Ingle, Ltd. Mr. T. A. Buttery, F.I.A.S., architect, Queen-street, Morley, and 1, Basinghall-square, Leeds:—

Mason: J. Pullan, Beeston	£246	0	0
Joiner: G. W. Fergusson, Leeds	110	0	0
Plumber: F. Hargreaves, Churwell	49	0	0
Plasterers: Barraclough & Rennison, Morley	34	13	0
Slater: J. W. Richmond, Leeds	22	10	0

MORETON HAMPSTEAD.—For sewerage works, for Newton Abbot Rural District Council. Mr. S. Segar, F.I.A.S., Newton Abbot:—

T. Vanstone ..	£815	0	0	R. C. Brebner & Co.	£563	15	0
H. V. Smith & Co.	665	12	10	T. Shaddock ..	515	4	6
W. C. Shaddock	657	10	10	Parker & Brimblecombe, Moreton Hampstead* ..	475	16	9
E. Pike	656	18	0				
Jefford & Sons	612	2	5				
Hawking & Best	607	11	0				

PONTYWANN.—For extensions and alterations to the County Secondary School, for Monmouthshire Education Committee. Mr. R. L. Roberts, Architect, Abercarn. Quantities by Architect:—
J. Pritchard, Pontymister, Monmouthshire* £1,385

SEMER.—For alterations and additions to the drainage at the Workhouse, for Cosford Guardians. Mr. H. J. Wright, architect, 4, Museum-street, Ipswich:—
Downs & Stephenson, Hadleigh, Suffolk* .. £110

SHEFFIELD.—For erecting additional offices, messroom, and retaining wall at Lumley-street Destructor, for the Health Committee. Mr. Charles F. Wike, C.E., City Engineer, Town Hall, Sheffield:—
Wellerman Bros., Manchester and Sheffield .. £343 12

SOUTH ELMSALL (Yorks).—For erecting a brick church, for the Building Committee. Mr. J. Nicholson Johnston, architect, Yeovil, Somerset:—

W. Hanley ..	£5,063	10	0	Swift Bros. ..	£3,849	5	0
Rhodes Bros..	4,641	0	0	D. Gill, Doncaster*	3,821	15	0
F. R Bartlett	4,519	11	6	Selam & Co...	3,567	0	0
E. E. Dickinson	4,441	0	0				
G. F. Kirk....	3,857	13	0				

WANSTEAD.—For the erection of receiving homes, Wanstead, for the Guardians of the Poor of the West Ham Union. Messrs. J. T. Newman & Jacques, architects, 2, Fen-court, E.C. Quantities by Messrs. R. L. Curtis & Sons:—

Fitch & Cox	£28,321	0	0
Harris & Wardrop	25,693	0	0
C. Wall, Ltd.	24,959	0	0
Myall & Upson	24,483	4	6
Webster & Son	24,321	0	0
A. N. Coles	23,818	12	2
Pattinson & Sons	23,311	0	0
F. & G. Foster	23,250	0	0
Kirk & Randall	23,234	0	0
B. E. Nightingale	23,075	0	0
Gathercole Bros.	23,000	0	0
Allen & Son, Ltd.	22,934	0	0
W. J. Maddison	22,579	0	0
Brand, Pettit, & Co.	22,400	0	0
F. & A. Willmott	22,063	0	0
Spencer, Santo, & Co	21,998	0	0
F. & H. F. Higgs	21,614	0	0
J. W. Jerram	21,349	0	0
F. J. Coxhead	21,115	0	0
A. E. Symes	20,919	0	0
H. J. Carter	20,646	0	0

WEST MOOR.—For constructing carriageways, etc., in Ash-terrace, Maple-street, etc., for the Tynemouth Rural District Council:—
T. Coxon, Holywell Village* £363 5 3

WIMBLEDON.—For the erection of the Wimbledon Technical Institute Extension:—
Spencer, Santo, & Co., Kensington* £8,310

WINCANTON.—For new hospital buildings and roads, drains, etc., for Wincanton District Isolation Hospital Committee. Mr. A. J. Pictor, A.R.I.B.A., Bruton, Somerset:—

T. Lydford	£2,323	1	0
R. G. Spiller	2,036	0	0
S. Dodimead & Sons	1,958	0	0
A. Wills & Sons	1,940	10	0
E. G. Padfield	1,931	7	10
Wort & Way	1,879	17	7
J. Long & Sons	1,860	0	0
H. Pittard & Sons	1,852	10	0
E. Chancellor & Sons	1,840	0	0
Sainsbury Bros.	1,821	2	11
T. Stockham	1,775	10	0
T. S. Hobbs	1,764	7	2
Sweetman Bros.	1,763	3	0
G. Moore & Sons	1,746	0	0
R. J. Stead	1,737	0	0
C. Bryer, jun., Bridgwater*	1,684	0	0

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(Incorporating the Ham Hill Stone Co. and C. Trask & Son, The Doulting Stone Co.).
Norton, Stoke-under-Ham, Somerset.
London Agent:—Mr. E. A. Williams, 16, Craven-street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

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